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december 1958

Grinding and finishing

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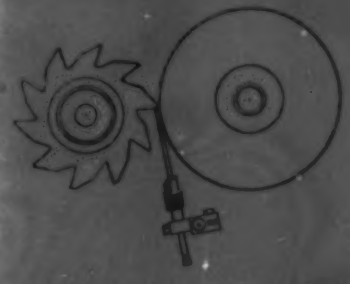
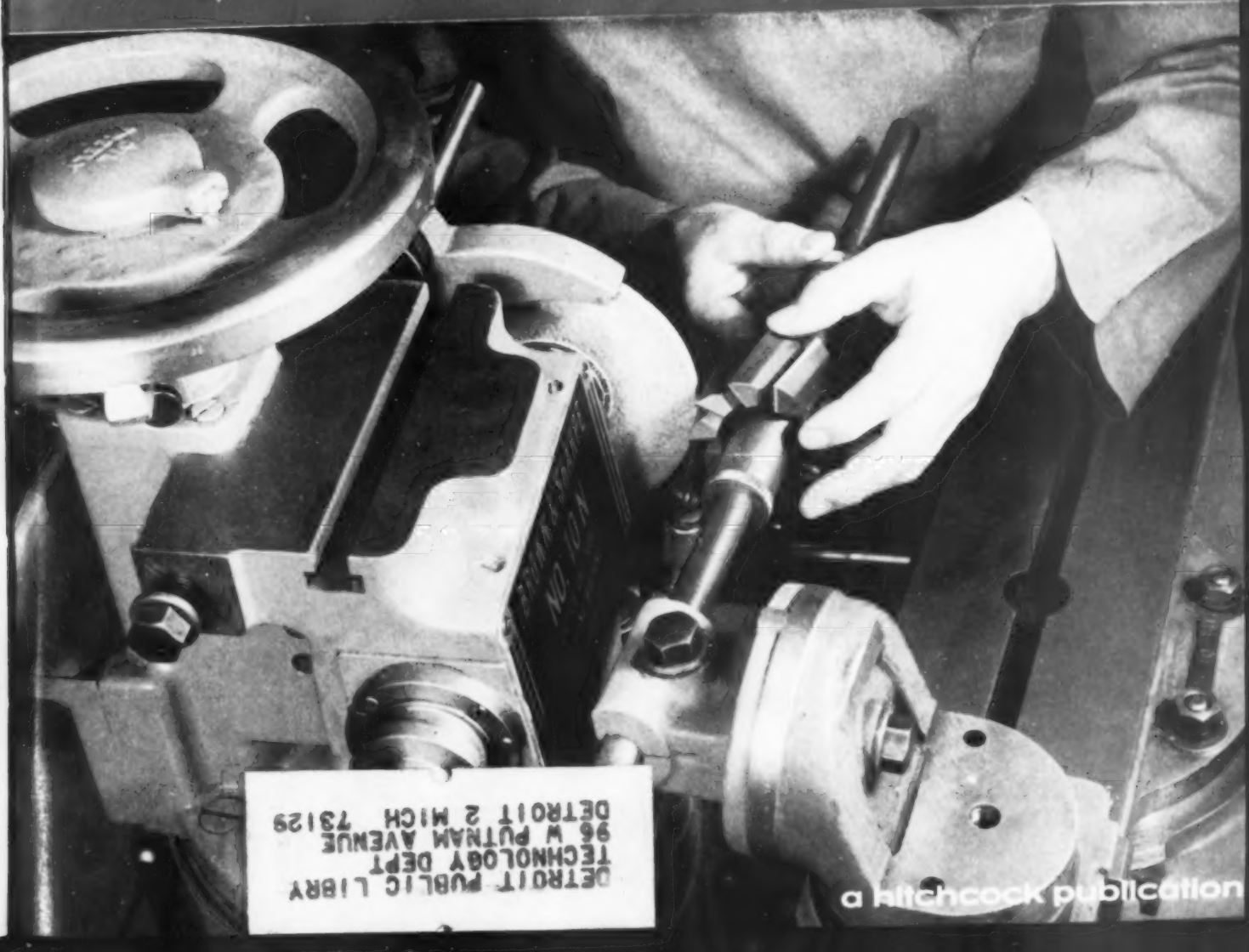
- How to Use Coated Abrasives Safely
- Predicting Abrasive Production From Steel, Auto Forecasts
- For Critical, High Precision Grinding . . . Give the Operators Private Rooms



The Art of Tool Sharpening



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. . . states Mr. Creighton Blanchard, toolroom superintendent at New Hampshire Ball Bearings, Inc., Peterborough, New Hampshire

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SURFACE GRINDER

is winning enthusiastic approval wherever precision work is required

Here's what Mr. Blanchard has to say about the new Type D machine:

"We have three grinders in our toolroom—a Thompson and two competing machines. In our general toolroom grinding, especially on carbide and hard metals, we find the Thompson Type D so superior that we have recently purchased another Thompson just like it. All our precision work goes on the Thompson."

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- Immediate delivery available.

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THE THOMPSON GRINDER CO.
SPRINGFIELD, OHIO

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Thompson
SURFACE GRINDERS

. . . Wherever abrasive operations are performed

grinding and finishing

Contents • December, 1958

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BPA

FEATURE ARTICLES

The Art of Tool Sharpening 20

This illustrated feature describes and pictures in sketches and photographs some of the "know-how" that still makes tool sharpening an art. By Thomas Hindson.

For Critical, High Precision Grinding . . . Give the Operators Private Rooms 24

A new building provides an opportunity for an imaginative approach to a long-standing industrial problem. By M. M. Patterson.

Predicting Abrasive Production from Steel, Auto Forecasts 26

A critical examination of the effect of total steel production, alloy and stainless steel tonnage and passenger vehicle production on the abrasive industry. By Otto L. Forchheimer.

Wall Chart Aids Grinding Efficiency 33

A handy device to assist tool room attendants in proper mounting of resinoid wheels on portable grinders. By Clement F. Brown.

Correct Adapters for Depressed Center Wheels 34

Tests indicate that a properly fitting adapter lengthens the life and improves the performance of a Type 27 reinforced wheel. By W. F. Parsons.

How to Use Coated Abrasives Safely 36

Fundamentals of the safe use of belts, disks and other forms of coated abrasives. By Wilbur E. Kidder.

SHOP HINTS 40

DEPARTMENTS

Letters 4
Grinding and Finishing Around the Country 10
News of Metalworking 14
Editor's Page 19
Grinding Safely 31
Questions & Answers 39
Free Literature 42
New Equipment and Materials 45
Abrasive Society News 55
News of Industry 56

Advertisers Index and District Managers listed on Return Card Insert

Profit-saving Performance on every job!

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618 MICROMASTER
SURFACE GRINDING MACHINE

THE NEW 618 is designed by Brown & Sharpe specialists to deliver new savings and profits on every type of surface grinding job. It provides *all* the capacity, *all* the speed and efficiency you need to meet today's toughest demands in the toolroom and in continuous production runs. You get *300% faster* table speed range . . . *60% larger* work space area . . . *super-precision* performance.

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- **AUTOMATIC LUBRICATION** — assures long wear, simplified maintenance
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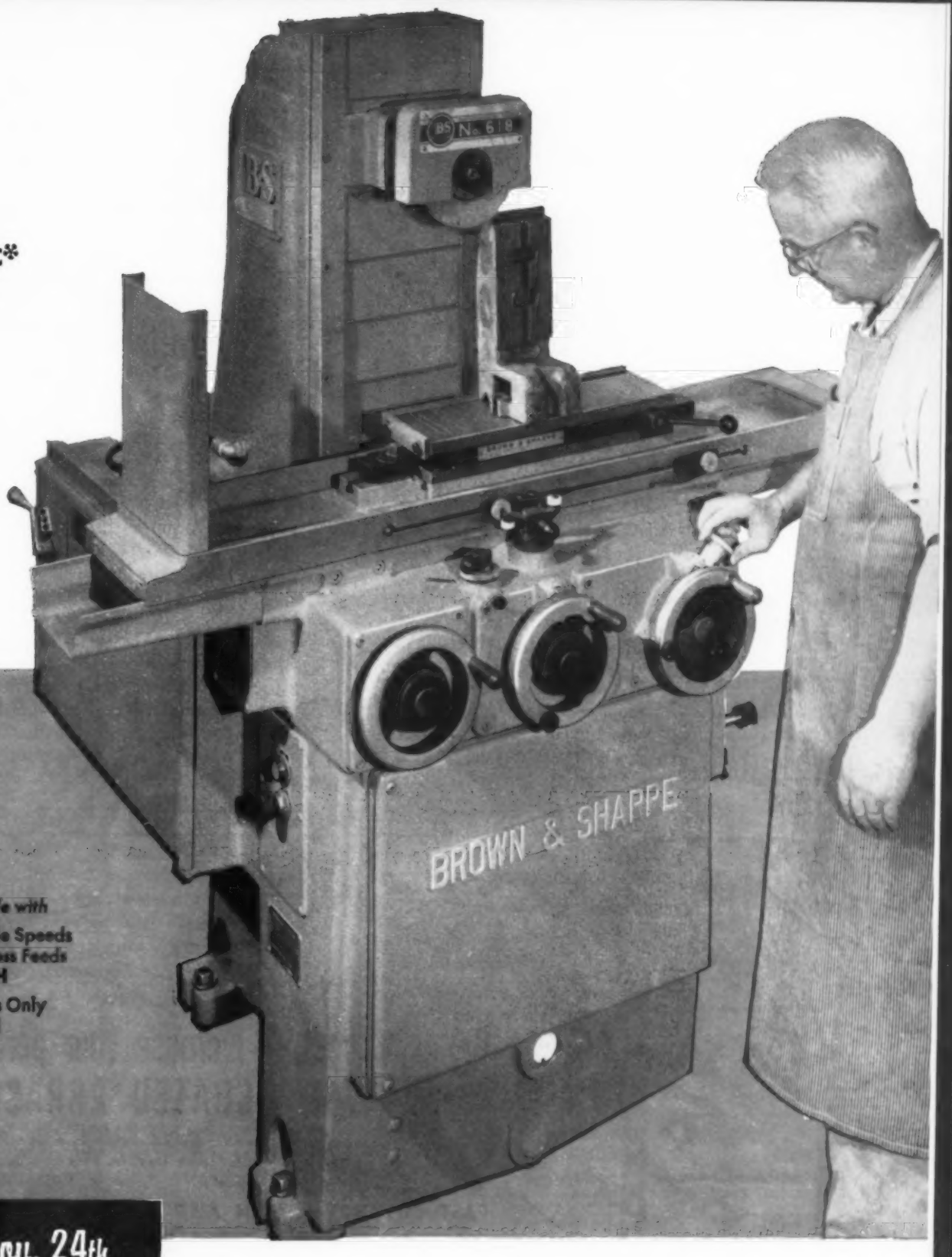

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Letters to the Editor

Electrically Aided Grinding

We would like to add several important footnotes to the article "Electrically Aided Grinding," which appeared in your issue of October, 1958, to the extent that it purports to offer operating instructions for Anocut electrolytic grinding equipment.

1. The article conveys the impression that 7½ volts is the proper operating voltage. There is no proper voltage. The voltage depends on the type of material including the grade of carbide, the make and condition of the wheel, and the work pressure, and will range from 3 to 10 volts for carbides and may go higher for other materials.
2. The current of 250 to 270 amperes specified in the article is excessively high for this material and the area of the work (½"x½"). A current in the range of 150 to 170 amperes is normal for this steel-cutting grade and area of carbide. Cast-iron grades draw lower current than this; use lower voltage. Larger areas draw more current; smaller areas draw less. The excessive current indicated in the article may arise from conductive material in the wheel making contact with the work and passing current by short-circuiting. Such material may be wheel loading, wheel bond or conductive abrasive "filler" used in some diamond wheels, e.g., silicon carbide. Whatever the cause of the excessive current, it is undesirable.
3. The article refers to the attempted use of a 2½-gallon coolant tank. The equipment initially shipped to the user included a 25-gallon tank. Adequate coolant tanks are always recommended.
4. The article states that a diamond wheel which does not run true can be trued by deplating. Perhaps this is true of this particular make of diamond wheel. It is our experience with other wheels that this cannot be done, and should not be attempted because of risk of excessive and needless diamond loss. We have not found 45 seconds an adequate deplating period under most circumstances. Under most operating conditions, it is recommended that the user do not use any deplating procedure whatsoever, as a proper wheel needs none.
5. The article proposes a limit of ⅛" of overrun when the wheel oscillates beyond the work. A better limit is 1/32". The larger (⅛") limit will slow down removal and cause unnecessary wheel wear.
6. The use of indicating screws for the purpose of truing a wheel to flatness is no longer recommended as it has been found that this sometimes causes inadequate electrical contact between the wheel and the mounting surface on the spindle. The proper procedure is to see that the wheel mount is true and that the wheel itself is flat and parallel between the front and back surfaces.

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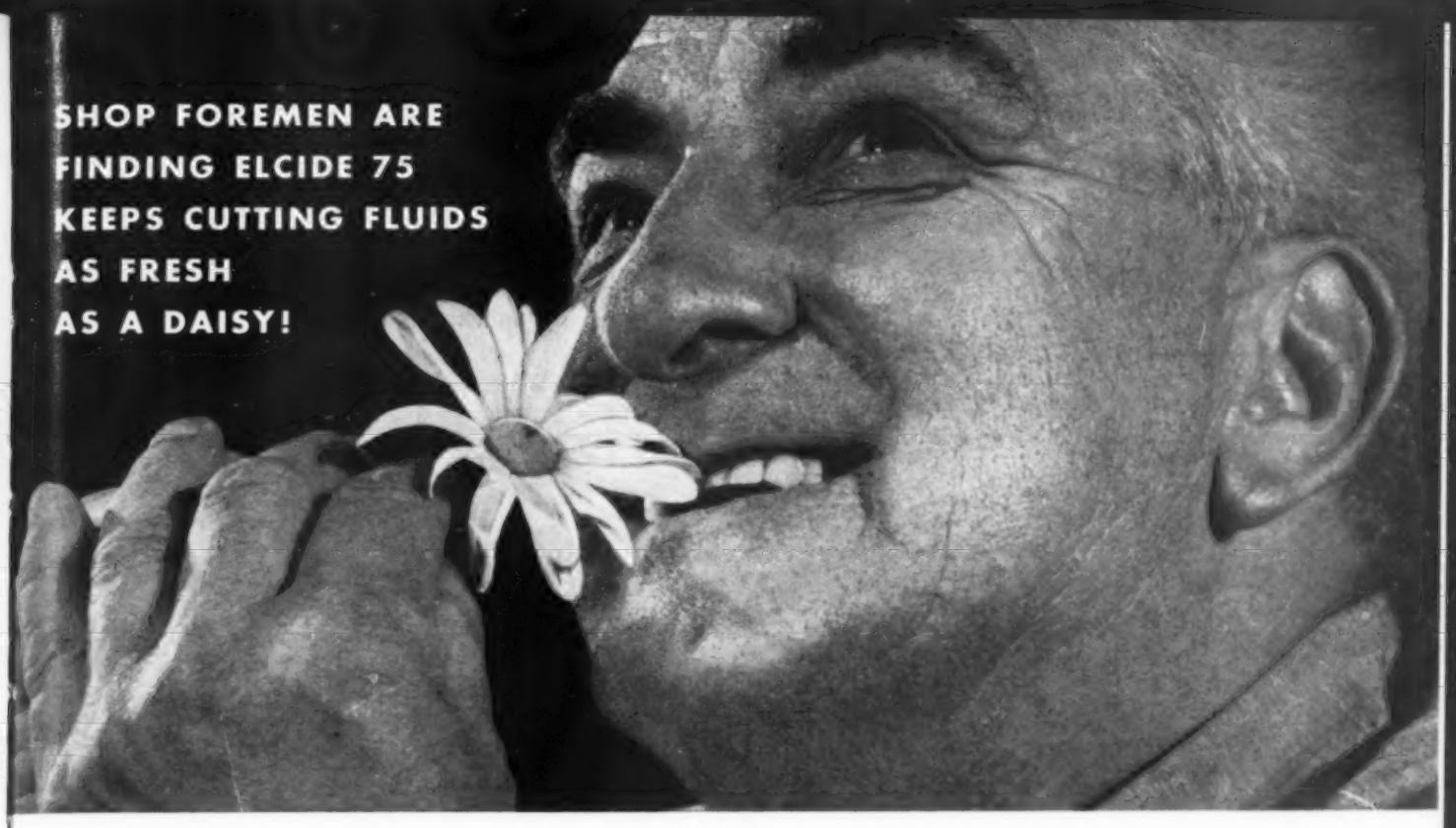

You have less down time when you treat emulsions with new ELCIDE 75™

One ounce of Elcide 75 per each four gallons of standard duty soluble oil emulsion controls the harmful bacteria that shorten emulsion life. In one shop test, emulsions treated with Elcide 75 lasted 5½ times longer than untreated emulsions!

Longer emulsion life means less down time and more efficient use of labor. The time lost on recharging emulsions is greatly reduced, and so is the size and expense of disposal problems.

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Elcide 75 effectively controls bacteria that cause odor, staining, corrosion, and emulsion breakdown because it is a *combination* of two powerful antibacterial agents. It includes a powerful new compound related to one of the safest and most effective bacterial inhibitors used in the exacting field of medical surgery. Elcide 75 covers a much wider range of bacteria than the single inhibitors commonly used in emulsions today.

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Active Ingredients—Sodium Ethylmercuri Thiosalicylate (Thimerosal) and Sodium *o*-phenylphenate.

Package	Price per Gal.
1-gallon polyethylene	$8.50
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Sold only through selected distributors.

Lower your operating costs. If you use standard duty soluble oil emulsions, Elcide 75 can save you money. Production goes up as costs go down. The reduction in total soluble oil purchases can more than pay for the cost of using Elcide 75. Why not try Elcide 75 in your plant operation soon?

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PATENT PENDING

Lilly

Lilly's brand of bacterial inhibitor for cutting fluids

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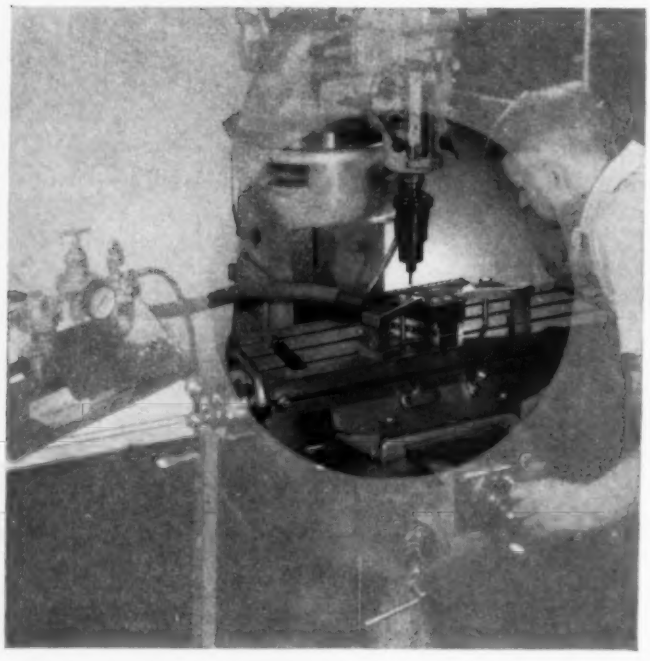
JIG GROUND with

Vulcanaire



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tools

Letters to Editor

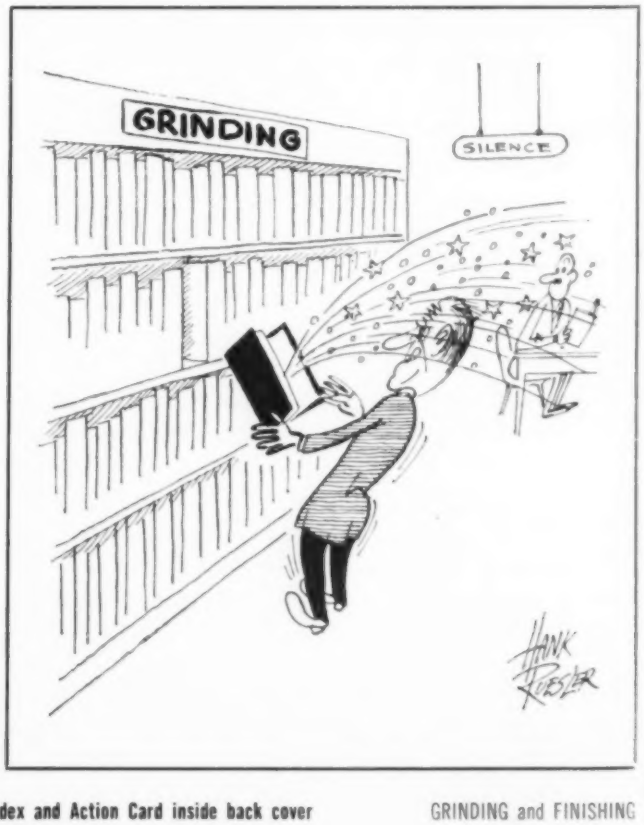
(continued)

7. The article (in the graphic charts on page 2?) indicates a linear removal rate of only .040" per minute on Grade 350 carbide ½" x ½" in section. This is only about 50 to 60 percent of the normal expectancy, which is .070" to .090" for this carbide grade under these conditions.
8. Finally, test work of this kind should always include the measurement of spindle power by the use of a wattmeter or ammeter in the power lines to the spindle motor. By making simple and appropriate adjustments, it will be found that as electrolytic removal is maximized the spindle load falls to a very low value as compared with conventional grinding. If the spindle load remains high, it is an indication that material is being removed by abrasion with conseqeunt friction causing the usual attrition and wear of the abrasive material.

Lynn A. Williams
Anocut Engineering Co.
Chicago, Illinois

Editor's Note:

● This article is the report of tests witnessed by the author. The results were derived from tests on AIT wheels only and do not purport to be conclusive for wheels of other manufacturers. We suggest that all users make their own trials under their own conditions starting with manufacturers recommendations to determine the most suitable wheel and operation procedure.

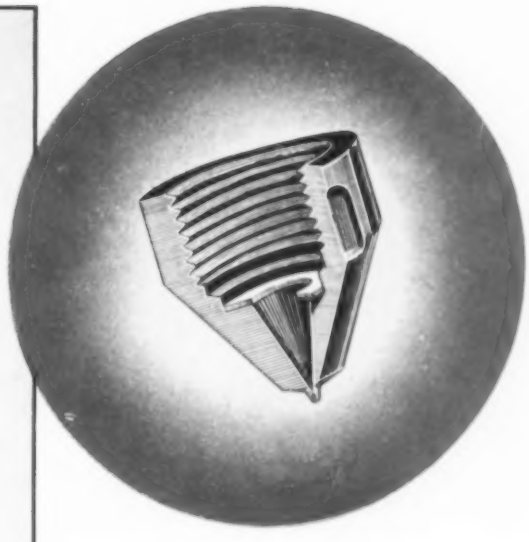


Deburring and Cleaning

8 TIMES FASTER — and Better

by Liquid Honing with EXOLON FASTBLAST

Photo courtesy Vapor Blast Mfg. Co., Milwaukee, Wisconsin.



The almost microscopic holes in this Diesel fuel injector cup were deburred and cleaned by Liquid Honing with EXOLON FASTBLAST. And, best of all, it produced a smooth surface that promoted better fuel flow and cut down gum deposits — all at a saving of 87.5% over conventional methods.

If you have a finishing operation, let our technical and research staff estimate your savings by changing to this profit making method! Mail coupon below for fast service!

Liquid Honing is a method using EXOLON FASTBLAST (aluminum oxide) abrasive in particles so small they can be suspended in a slurry and thrown at high speed against the work to be finished. Scales, burrs, carbons, oxides are quickly removed — in fact one man and one machine equalled the former production of eight men using conventional methods in the deburring and cleaning of the Diesel fuel injector cup illustrated.

The rate of finish is controlled by varying the air pressure, abrasive size, type and concentration, blast angle and distance of nozzle from the work. The abrasive mesh sizes are usually 80, 100, 150, 180, 220, 240, 320, 400 and 600.

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We are interested in saving money on our finishing.

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- ☐ Send us information on EXOLON FASTBLAST.
- ☐ Send us information on "Liquid Honing".

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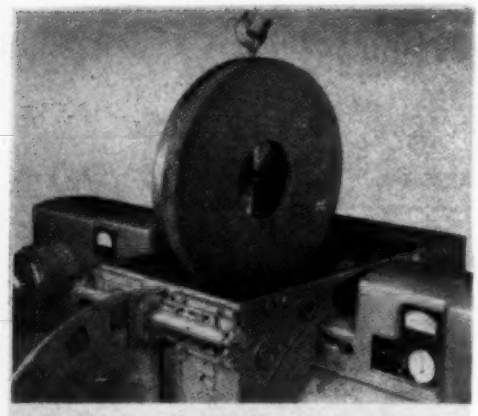
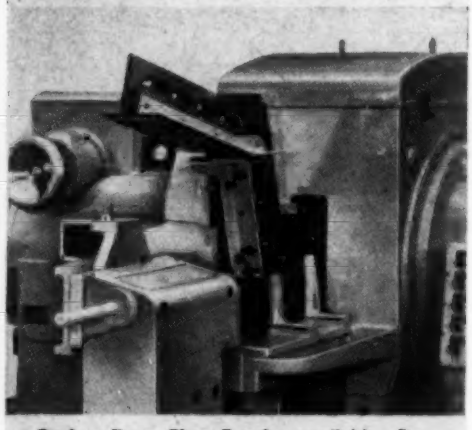
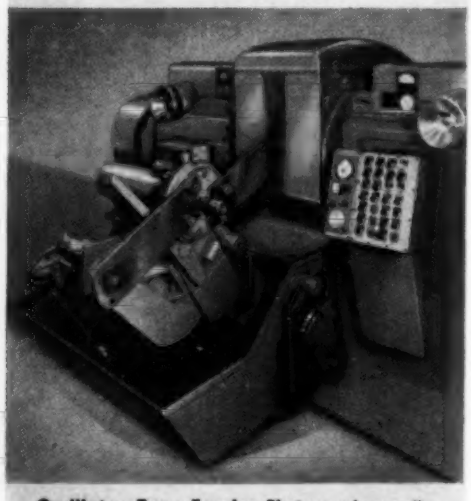


Simple Abrasive Change thru top of hood cuts down time. Three easy steps take approximately 30 minutes.



Pusher-Type Thru Feeder available. Provides high-volume production on work ⅜" to 7" O. D., and from ¼" to 1¼" thick.



Oscillator-Type Feeder Fixture also available. For very close accuracy where production volume is not large.

Besly-Titan Abrasive Discs and Wheels are available in a wide range of types and sizes. Experienced Besly Abrasive Engineers are operating nation-wide. For details, write to Besly-Welles Corporation, 20 North Wacker Drive, Chicago 6, Illinois.

Engineered to give you all these advanced, proved features

- simplified push-button operation
- accuracy to tenths
- automatic dressing
- automatic sizing
- centralized "one-shot" lubrication
- automatic return of abrasives to grinding plane after dressing or change
- rugged, rigid base
- push-button controlled quill feed
- built-in dial indicators for abrasive movement
- built-in "usable abrasive gage"
- built-in motor load meters
- dial indicator for precise head alignment
- universal head tilting with micrometer adjustment
- concealed wiring and piping

AND MANY OTHERS, **write for Bulletin DH4**

Choose The Features To Meet Your Needs

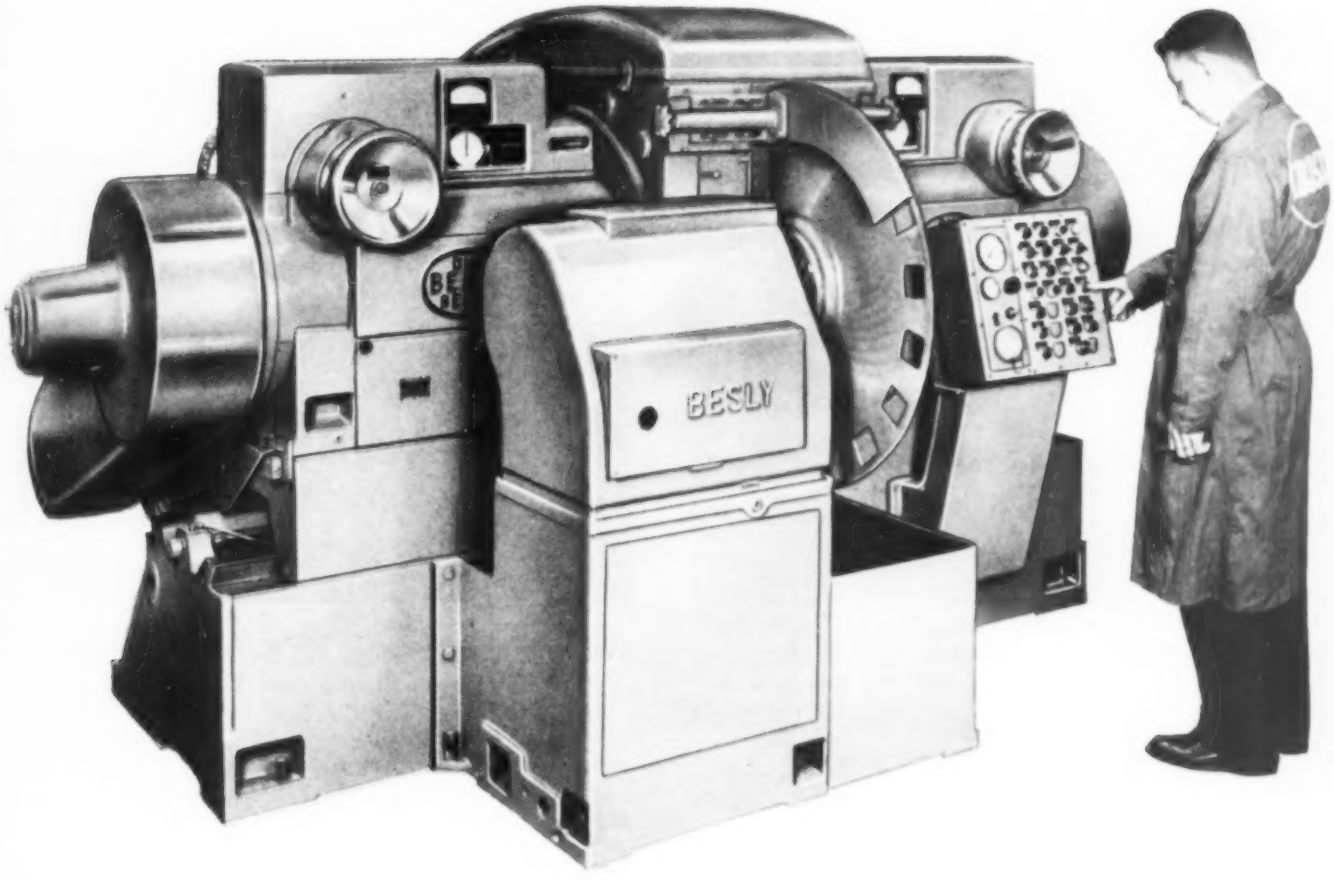
The DH4 Grinder is engineered and specifically designed to provide all the features mentioned here. If some of them are not required for your operations, you can specify only what you need. Should your requirements change later, the basic machine design permits easy addition of the omitted features. This Besly engineering principle lets you get exactly the machine you need with the features you need—without costly waiting or redesign.

Economically grinds parts and materials like these:

parts	bearing races piston rings gear blanks	valve plates pump vanes clutch plates	or any part with two flat surfaces of nearly equal area which must be parallel to each other
materials	steel cast iron and their alloys	non-ferrous metals carbides	ceramics plastics

makes disc grinding virtually AUTOMATIC

spindle disc grinder



Besly's Famous "Sealed Quill Construction"

is built into this *all-new* grinder. Removed from the motor and other mechanisms for highly sensitive feed control, the spindle sleeves are cradled in the heads. They are moved by the feed screw, sliding on replaceable lubricated ways with clearance adjustment provided. Precise disc and head adjustment is constantly maintained for consistent grinding accuracy.

BESLY

For complete engineering details—write for Bulletin DH4

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. . . wherever abrasive operations are performed

Grinding and Finishing Around the Country

Union Tank Car's Geodesic All-Steel Dome

A giant golden all-steel dome has been constructed by Union Tank Car Co. of Chicago just north of Baton Rouge, La. The first major industrial application of the geodesic principle of design, it houses Union Tank's regional repair and maintenance facilities for tank cars. The largest circular building in the world, the dome is 384′ across its base and 120′ high—big enough to enclose either a football field or major league baseball diamond.

The dome and the connecting tunnel (right foreground) where cars are painted, were constructed of six-sided steel panels, welded together and strengthened by a system of interlocking rods and pipes.

Inside the structure is another geodesic-type dome, 80′ high, housing offices, employee quarters, materials storage and a control tower.

A similar dome is now being constructed in Wood River, Ill. •

Standard Set Up For the Safe Use of Industrial Beta Ray Sources

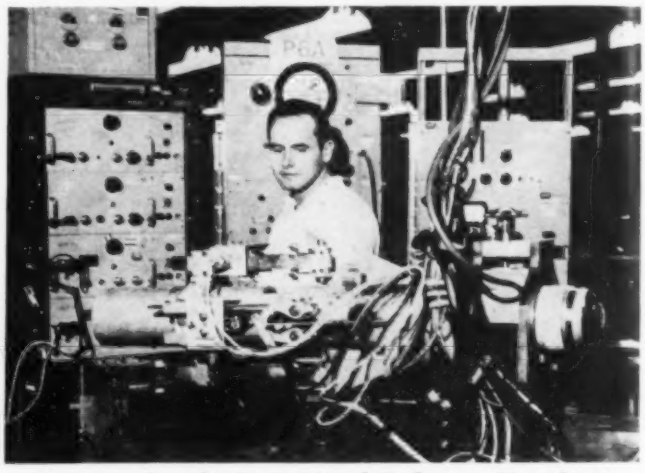
"Radioactive isotopes are inherently no more dangerous than high-voltage electricity, corrosive acids, rotating machinery, or any other potential hazards commonly found in industry," says Dr. Robert S. Rochlin, General Electric Co., a member of the committee which developed the American Standard Safe Design and Use of Industrial Beta Ray Sources, Z54.2-1958.

American industry is now reportedly saving $400 million a year through the use of radioactive isotopes. It is expected to rise to $5 billion within the next five years. •

Testing the Sidewinder's Infrared "Eye"

The deadly accuracy of the Sidewinder's infrared "eye" and the missile's complete guidance and control system is shown checked on the simulated flight test equipment at Philco Corp.'s Government and Industrial Division plant in Philadelphia. Philco is the major producer of the air-to-air missile which has been used by the Chinese Nationalist Air Force against Chinese Communist jets.

The Sidewinder strikes its target by homing in on the infrared radiations (heat) of an enemy jet, destroying the aircraft in a fiery explosion.



Conceived at the U. S. Naval Ordnance Test Station (NOTS), China Lake, Calif., and developed by Philco and NOTS, the missile has been in operation with the Navy's Sixth and Seventh Fleets. The U. S. Air Force has armed its newest jet fighters, the Lockheed F-104A, with this 9′, 155 lb.-missile which is fully maneuverable at supersonic speeds at all altitudes. •

Stainless Steel Helps In-Flight Refueling

Pittsburgh, Pa.: Fueling a jet in mid-air is being done with the help of precipitation hardening stainless steel AM-350, made by Allegheny Ludlum Steel Corp. Two Douglas Aircraft Co., Inc., A3D Skywarriors are shown using the in-flight refueling system. The inset shows a closeup of the A3D tanker drogue receptacle fairing kit after two .050 AM-350 sheets have been cut, formed and welded to make the unit. The sub-assembly is then joined to other components, and the unit is installed in the larger fairing assembly. The steel can be easily formed in a soft condition and then hardened by heat treatments. •

NEW MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK, far surpasses such safety features as anchor bushings, safety rings, special hub mountings, or ordinary revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-752R1

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

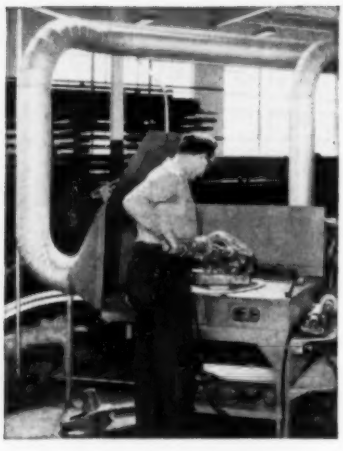
AIR IN MOTION KEEPS MEN IN MOTION

Dusty or fume-laden air can curtail production and increase maintenance costs by dulling worker efficiency and damaging bearings, motors . . . even machines.

Efficient K & B Dust Control Systems put AIR in Motion to become an important production tool.

In the plant of a noted chain and forging firm, an official made this comment about a new K & B installation: "Our workmen can now work full time . . . this means added production for them and for the company as well."

Call on K & B engineers to put *AIR in Motion* and help boost your plant efficiency. The Kirk & Blum Manufacturing Company, 3124 Forrer Street, Cincinnati 9, Ohio



K & B system serving castings grinding removes dust, sand and chips as fast as they are produced. Work revolves on turntable to enable operator to work continuously.

50 YEARS OF SERVICE

KIRK & BLUM

DUST CONTROL

K & B Down Draft Dust Control System in plant of The Monarch Machine Tool Co., Sidney, Ohio

Grinding and Finishing Around the Country . . .

160" Wide Steel Rolled

For use in rocket motors, Lukens Steel Co. of Coatesville, Pa. has succeeded in rolling the widest sheet of high-strength steel ever produced as part of a development program in so-called "second generation" rocket motors using solid fuels. The sheet, measuring 160" wide, was produced by the pack-rolling method on Lukens' 206" plate mill, reported as the largest in the nation. •

Chamber Simulates 200,000' Altitudes

A new environmetal temperature altitude chamber capable of simulating altitudes up to 200,000' has just been acquired by the New York Testing Laboratories, Inc., 47 West St., New York, N.Y. The chamber is especially designed to test components that will go into the manufacture of space vehicles and missiles. •

Unifying Drafting Practices

Fourteen years of devoted efforts to unify drafting practices in the United States, Britain, and Canada is threatened by intense publicity for simplified drafting practices. This is the opinion of George Noble, writing in the August issue of *The Magazine of Standards*, published by the American Standards Association.

Noble observes that a tremendous amount of time and money has been spent by the three companies to unify the drawing practices of the inch-using and English-speaking world.

B-L-H To Make Magnet Cores To Guide Protons In Harvard-M.I.T. Accelerator

PHILADELPHIA: A contract for constructing 612 magnet cores for the most powerful electron-beam atom smasher ever built—a six-billion electron-volt accelerator—has been awarded to Eddystone Division, Eddystone, Pa., of Baldwin-Lima-Hamilton Corporation. The Cambridge Electron Accelerator is being built at Harvard University for joint operation by scientists of Massachusetts Institute of Technology and Harvard. Its construction, which will cost about $6.5 million, is being supported by the Atomic Energy Commission. •

Wheels coated with ALUNDUM abrasive give housing covers a high polish faster and for less money. Setting up the wheels, as shown, is an easy job. The high capillarity of this polishing grain improves and speeds up the wetting process with glue or cement.

Pay less for polishing...set your wheels up to save!

ALUNDUM abrasive brings you the value-adding, cost-cutting "Touch of Gold"*

Norton abrasives are first choice in many plants for better results at lower costs, in the widest range of polishing jobs.

Where especially long life is desired, the blocky shaped E_1 ALUNDUM B abrasive is extremely popular. Available in grit sizes 14 to 240. Where faster cutting action is required E_{138} ALUNDUM S abrasive (sizes 14 to 90) or E_{138} ALUNDUM R abrasive (sizes 100 to 240) are first choice. All three types are specially treated to give much greater adhesion with glue or cement. Typical advantages common to all ALUNDUM polishing grains include:

- *Uniform grain shapes*, which assure fast, uniform cutting action.
- *Uniform grain sizings*, with no oversize grains that mar the finish, no undersize grains to loaf on the job.
- *High capillarity*, assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels.

The booklet "Setting Up Metal Polishing Wheels and Belts" contains valuable facts on the various types of ALUNDUM abrasive . . . on the applications of canvas, leather or wooden wheels . . . and on the best means of preparing wheels, with cement or glue. Ask your Norton Distributor for it. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

G-354

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

. . . wherever abrasive operations are performed

News of Metalworking

BBBI Sets Up Technical Service Program

CHICAGO: Under a newly established Technical Service Program, the Brass & Bronze Ingot Institute and its member firms are offering technical guidance and counsel to manufacturers and users of copper-base castings. Inquiries may be addressed to the Brass & Bronze Ingot Institute, 308 W. Washington Blvd., Chicago 6, Ill. •

Industry-Wide Inventory Plan

WASHINGTON, D. C.: Inauguaration of a new industry-wide inventory plan which will facilitate the location and sale of used machine tools to purchasers needing them was announced by the Machinery Dealers National Association, 1346 Connecticut Ave., N. W., Washington 6, D.C. Known as the Guaranteed Metalworking Machines Plan, it will be composed of a master file of 5″ x 8″ cards, with duplicate files in the hands of every MDNA member dealer in the nation. Members are encouraged to supply photographs and descriptions of all machines in their separate inventories to MDNA headquarters. •

Ex-Cell-O Wins Report Award

DETROIT: In the final ratings by an independent board of judges in the Eighteenth Annual Survey of *Financial World*, national weekly magazine, Ex-Cell-O Corp. was judged as having the best annual report of the Machine Tool Industry. The bronze "Oscar of Industry" was presented at the annual awards banquet at the Hotel Astor, October 27. Approximately 5,000 reports were originally entered. •

ASLE Gear Symposium Jan. 26-27, 1959

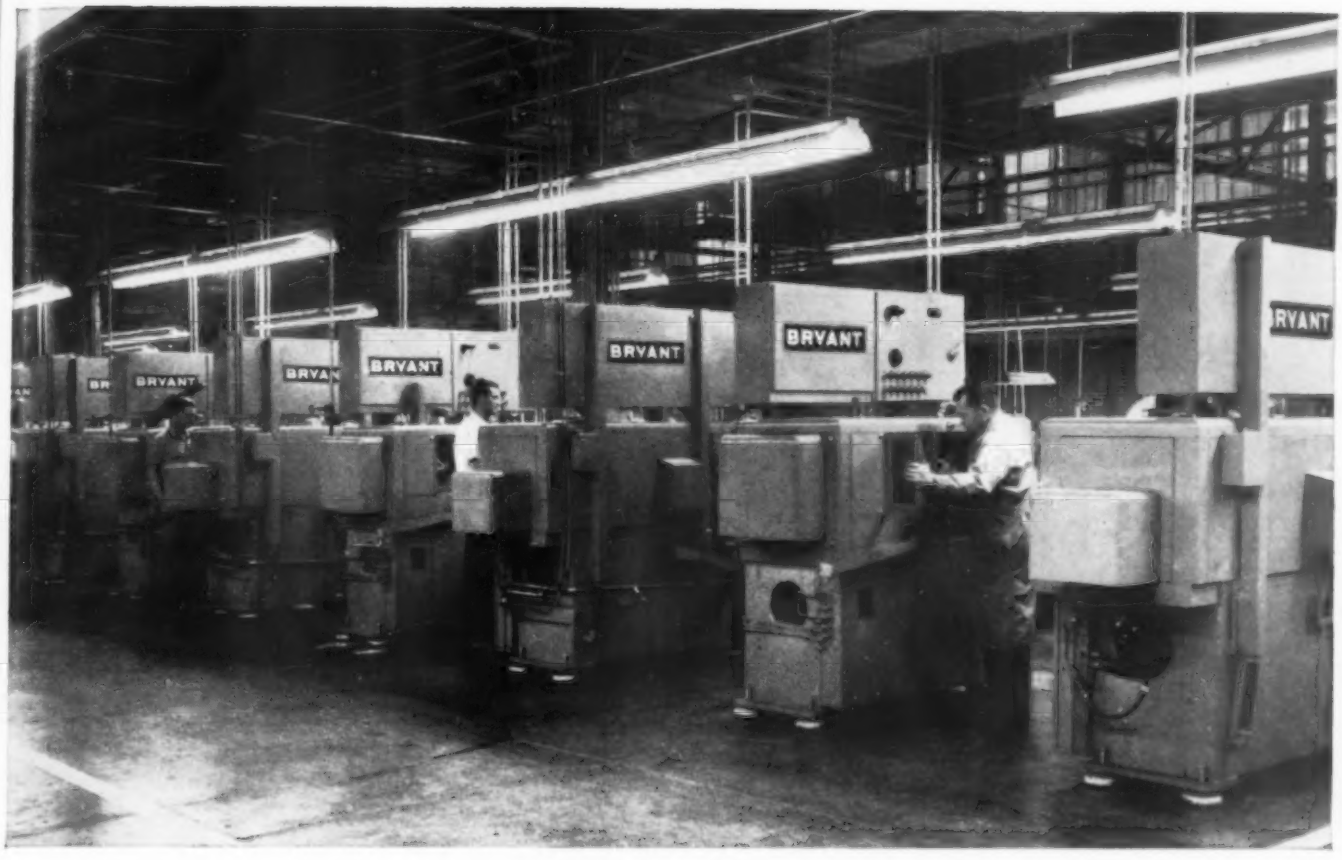
CHICAGO: The important relationship between modern gear design and gear lubrication will be the theme of the First Annual American Society of Lubrication Engineers Gear Symposium to be held at the Morrison Hotel in Chicago on January 26-27, 1959. To register, write the American Society of Lubrication Engineers, 84 E. Randolph St., Chicago 1, Ill. •

$4 Million Sales At Tool Show

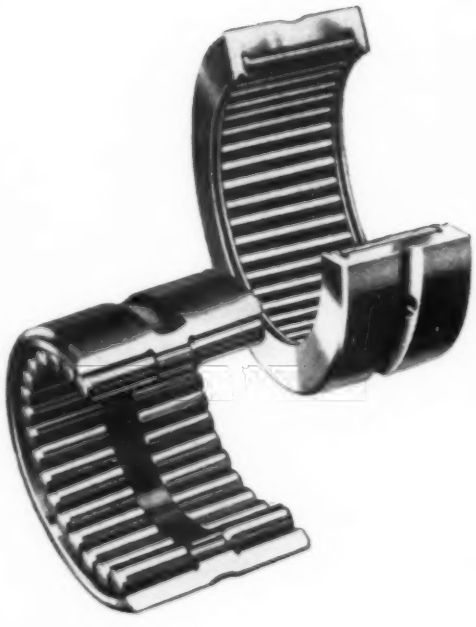
LOS ANGELES: Already showing signs of economic recovery, the manufacturing and production tool industry received an excellent stimulus from the American Society of Tool Engineers Western Tool Show at Los Angeles, Oct. 3. Exhibitors tallied up an estimated $4 million in on-the-spot sales of tools, accessories, and equipment, in addition to thousands of inquiries to be processed in the next few months. •

Multi-Million Dollar Merger Of Engineering Companies

DETROIT: A multi-million dollar merger of engineering companies was announced by Michael Pinto, President of Pioneer Engineering & Manufacturing Co., Inc., 19669 John R, Detroit. With Pioneer acquiring all of the assets of Wettlaufer Engineering Corp., Detroit, this organization reportedly becomes the largest engineering company of its kind in the country. In the new lineup, Pioneer will reorganize Wettlaufer into an operating division, similar to Douglas Tool Co., Detroit manufacturers of special machines, jigs, fixtures and tools. Elmer Wettlaufer, former President and Founder of Wettlaufer, becomes a member of the Pioneer Board of Directors. •



Bryant CENTALIGN Internal Grinders Increase Bearing Race Production up to 50%



The results obtainable with Bryant CENTALIGN Internal Grinders are illustrated by the case of a well-known manufacturer of precision roller bearings, who recently installed a battery of CENTALIGNS in his plant.

Previously, production difficulties had been posed by bearing design, and the necessity of adherence to very close tolerances. Accordingly, the manufacturer, in selecting his new production equipment, paid special attention to the factors of high production capability, extreme accuracy, and broad versatility.

After exhaustive investigation, Bryant CENTALIGNS were chosen over all competitive grinders. The wisdom of this choice is shown by the results: production increased up to 50% on varied lots of 5000 to 50,000 pieces. Accuracy is held well within specified tolerances.

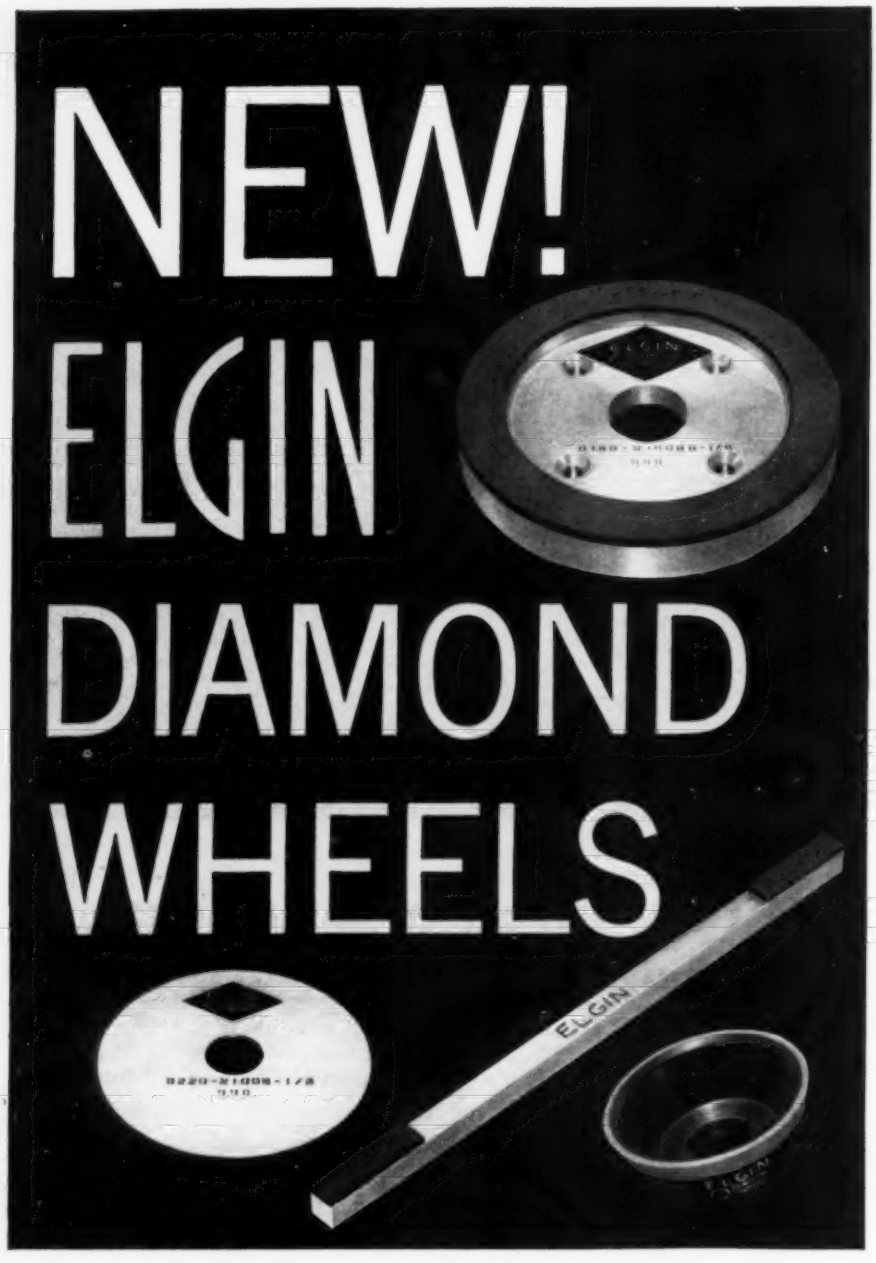
The unique engineering features of the Bryant CENTALIGN offer *you* top production efficiency, too. Write for detailed literature on Bryant CENTALIGN Internal Grinders.

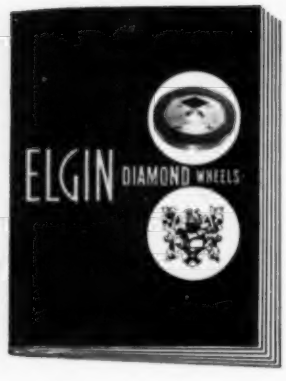
BRYANT Chucking Grinder Co.

85 CLINTON STREET, SPRINGFIELD, VERMONT

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Granite Surface Plates • Magnetic Drums for Computers • Special Machinery





Now – ELGIN offers you a complete line of Golden Circle Diamond Wheels with *guaranteed diamond content*

Diamond wheels—every shape, every size—resinoid, metal, or vitrified bonded—they're all available from Elgin! Guaranteed diamond content means more pieces ground per wheel, more return on your wheel-dollar. Consult an Elgin field engineer—his broad abrasives experience will help you select the right grit, wheel-shape, and bond—the wheel that will keep your grinding costs down. Our new diamond wheel catalog greatly simplifies ordering. Write for it today.

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

News of Metalworking . . .

Reducing Costs of Brazed Honeycomb

SAN DIEGO: The use of lightweight heat-resistant brazed honeycomb sandwich material for missiles and aircraft necessitates developing new testing methods to reduce the cost. These methods include the use of X-ray, fluoroscopy, ultrasonics, heat-sensitive paint, fluid repulsion, and infrared photography. Frank J. Filippi of Solar Aircraft Co. explained the problem in a paper presented to members of the Society for Nondestructive Testing meeting in Cleveland. •

Ford Executive Speaks At Lehigh University

BETHLEHEM, PA.: Theodore O. Yntema, Vice-President-Finance, Ford Motor Co., Dearborn, Mich., speaking before delegates attending the Pennsylvania Association of Deans of Liberal Arts Colleges stated that "the world constantly demands more and more of us in terms of sheer mental efficiency and general intellectual competence."

"Any man versed in the lore and schooled in the disciplines of a good liberal education possesses the essential keystone on which to build vocational and professional skills. Given the necessary added specialized training for his own trade, his chances of professional success are substantially greater than those of the man of a more narrow, technical educational background—however good that education may be," Yntema said. •

Floor Plans For 1959 Engineered Castings Show

DES PLAINES, ILL.: "Castings does it better at lower total cost" reads the text in the floor plan for the 1959 Engineered Castings Show, sponsored by the American Foundrymen's Society and scheduled for the Sherman and Morrison Hotels, April 13-17. The purpose of the show is to demonstrate the quality, utility and economy of castings, thereby encourging the greater use of castings by general industry in new product concepts and manufacture. •

For information about any advertised product, see the Advertisers Index and Action Card inside back cover

This is a black-and-white reproduction of a full-color photograph of our plant, taken at the height of the lovely Fall foliage season. Each year at this time, thousands upon thousands of beauty seekers, many with cameras, travel the roads of the Berkshires to enjoy the crisp Autumn air and to marvel at and record this richest of nature's displays.

Season's Greetings

We are grateful to those of you we have been privileged to serve during the year now ending.

For each of you, we wish all the joy and gladness of this holiday season. We hope that you will enjoy happiness, good health and prosperity throughout the coming year.

CORTLAND GRINDING WHEELS CORPORATION

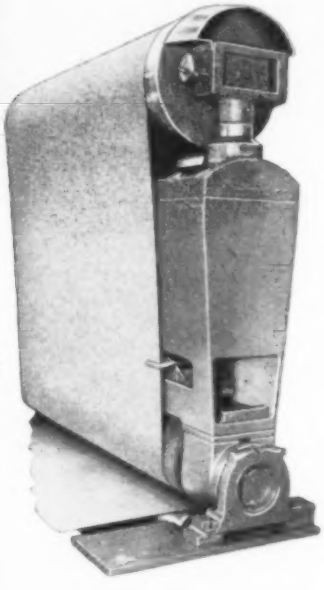
Chester, Massachusetts

CORTLAND

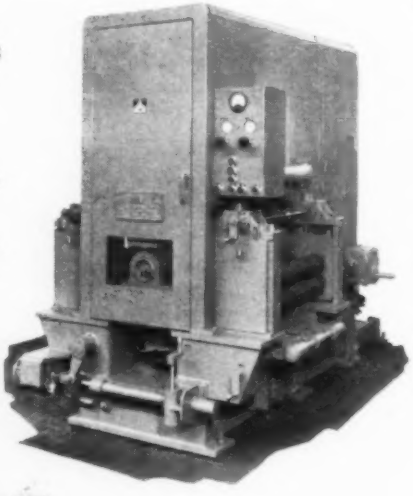
HILL Sheet and Plate polishing machine with reciprocating hydraulic table and vertical two roll head.

A HILL Polishing Machine of *YOUR OWN* will afford you important savings...

- *By eliminating mill extras.*
- *By proper finishing and prepolishing before forming.*
- *By enabling you to prepare the correct surface finish to meet each individual job need.*



● HILL polishing machines are now saving important percentages for manufacturers supplying the dairy and sanitation fields, for automobile bumpers, engravers plates and a wide variety of other industries.



HILL Pinch Roll type with vertical two roll head for polishing strip. Can be used singly or in multiple units for line production.

IT'S MOSTLY IN THE HEAD

Two rolls accurately controlled for speeds and pressures with easy adjustment for proper tension of the endless abrasive belt. For fine finishing of all types of ferrous and non-ferrous metals.

HILL ACME TOOLS FOR INDUSTRY

The HILL ACME Company

1207 W. 65th STREET • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

wherever abrasive operations are performed

EDITOR'S PAGE

What is Happening to the Skilled Craftsman ?

There are three reasons why the skilled craftsman is fast becoming extinct. One, he is no longer treated with the respect his additional skill and knowledge should command. Two, he is paid very little if any more, and sometimes less, than the push button production worker. Three, he has been almost impossible to replace as there is no incentive for the reliable younger man.

The first reason may be the result of the other two. That is, if the man in the shop does not make as much as his skill and knowledge warrants and if for reasons of seniority he is let out before less skilled workmen, he does not receive the respect of his fellow workers. Many cases have been recorded where the skilled craftsman has left a trade in which he was superior to obtain a little more respect in a job for which he was less suited. Companies have gone to great lengths to hold these men. Some firms have made these skilled men foremen in order to raise their standing. In the capacity of foreman they actually do not perform all the functions of foreman, but act as instructors for the younger men. In fact, they often are not suited for a foreman's duties, but by using their superior knowledge and experience the craftsman acting as a foreman can guide younger men in performing duties he could have done with ease. During this time the craftsman tends to lose his skill. He is no longer working with his hands, and just as the musician needs constant practice, so does the skilled craftsman. Therefore the companies in an attempt to use some of his abilities have forfeited the rest. This move may retain the respect for the skilled craftsman, but it does not solve the problem of the diminishing ranks of this important and very necessary group.

The second reason for the extinction of the craftsman is his relative reduction in pay. When a company could pay their employees according to their skill, knowledge and benefit to the company, the craftsman made more than double the sweeper. Now he may be doing well to make 50% more. The more organized the area, apparently, the less the differential. This has been a direct result of across-the-board raises. It should be noted that the skilled craftsman does not have the bargaining power within the big industrial unions where he has always been in the minority. This situation has resulted in the American laborer being held back by the slowest or least skilled members instead of trying to reach a higher level of ability.

The third reason for the loss of this extremely important man has been the lack of development of adequate replacement by younger men. Here again we can refer to the other reasons as being responsible to some extent for this situation. The main explanation, however, must fall on seniority. Seniority is the killer of incentive! What man will work harder than his fellow workers when he knows he can not advance in the same relationship. Why should he learn to be a skilled craftsman when if there are additional benefits they are so small in relation to the effort, and sometimes do not exist?

The young man in the shop today can reach the same level of pay and stature as his fellow workers by merely being there as long.

All is not as nearly lost as may be indicated by the above. There are still some young men who have a pride in workmanship and knowledge in spite of the jeers of their fellow workers. But we will still need a concentrated effort by unions and management together to solve the problem. This is a problem which is becoming at least as important as the shortage of engineers, if not more so. For even if we have enough engineers their achievements will be of no avail unless we have the skilled craftsmen to translate their ideas into machines, tools and products.

W. W. Patterson

MANAGING EDITOR

DECEMBER, 1958

The Art of TOOL SHARPENING

- ✓ *Design work rests to fit special jobs.*
- ✓ *Use ready-reference wall charts.*
- ✓ *Simplify formulas if possible.*

By **Thomas Hindson**
Grinding Machine Group
Brown & Sharpe Manufacturing Company

● An old-time woodsman did not regard his axe as sharp until he could shave hair from his forearm with it. In those days, many an hour after supper in the bunk house was spent in whetting axes to that kind of razor edge. Each man had his own methods for achieving the edge he wanted. Time, except perhaps on Saturday nights, was of little consequence, but the keenness of the finished edge was all-important. This, probably, was tool sharpening at its pinnacle as an art.

Of course an edge of this kind is not suitable for most industrial tool applications today; each tool must be sharpened to established specifications, and the eye or the thumb is no longer regarded as a suitable gage of sharpness. Production requirements in tool grinding are definitely a factor, though they may not be as rigid as in line operations. Time is no longer available for the leisurely—or what might be called the artistic—sharpening of tools. Machines have been developed which take much of the human element out of tool grinding, and which make it possible for semi-skilled and relatively inexperienced men to do what was formerly reserved for skilled mechanics.

Though these developments have caused tool grinding to become more of a science, tool sharpening is still an art, with plenty of opportunity for a man to exercise the skill and judgment that comes from long training and experience.

Cutter sharpening machines in first-class condition are essential. If a machine is worn, if the table weaves in motion, or if the spindle is sloppy, the results are the same as those which occur with a good machine run by a careless operator.

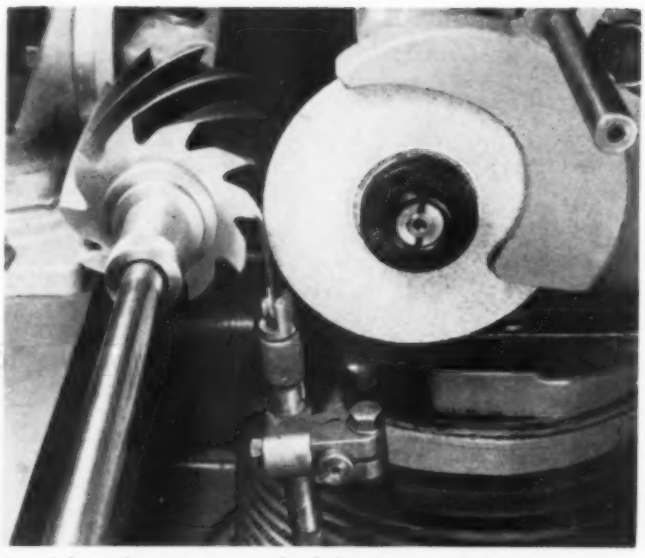
A good tool sharpener is not just a single-operation man. He must cover a full range. And because the tool room is often one of the most costly departments in a plant, the more a man knows, and the more operations he is able to perform well, the more valuable he is to his employer.

A skilled operator on a machine in first-class condition, however, is not the whole answer. In every shop there are short cuts and "tricks of the trade" which have never been written down, but have been passed along from operator to operator.

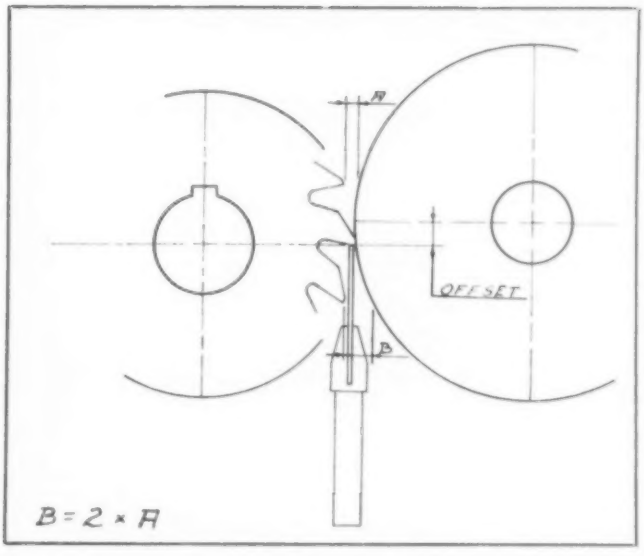
For instance, when forming a radius, it is usually a good idea to grind it a bit small and then bring it to size. This approach usually allows room for a small error in set-up. A radius can be ground larger, but it can never be reduced in size without resharpening the cutter.

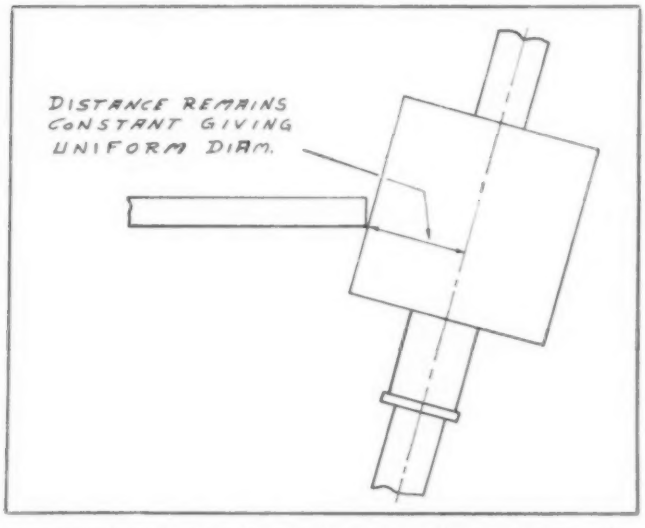
The tips which are illustrated and described in the pages which follow are some of the best of those which have come to the writer's attention during many years of observation and experience in tool rooms all over the country. They illustrate the kind of know-how that elevates tool grinding into tool sharpening.

The first three illustrations are examples of simple set-ups that save time in tool sharpening. Next are three variations of work rests, and finally, a chart of proper clearances on peripheral and side teeth of milling cutters. • • •

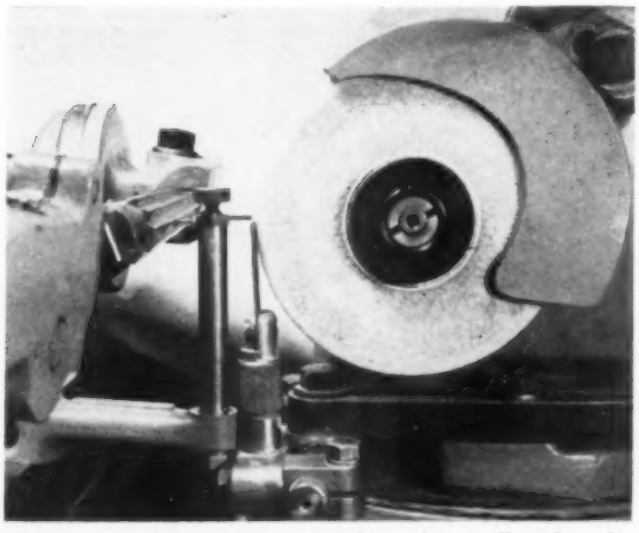


A quick and easy way to find the approximate clearance, when setting up to grind the diameters of any hole cutter, is illustrated above. With the grinding wheel in position against any tooth, the distance from the wheel to the tooth below (B) is roughly twice the distance from the wheel to the tooth above (A).

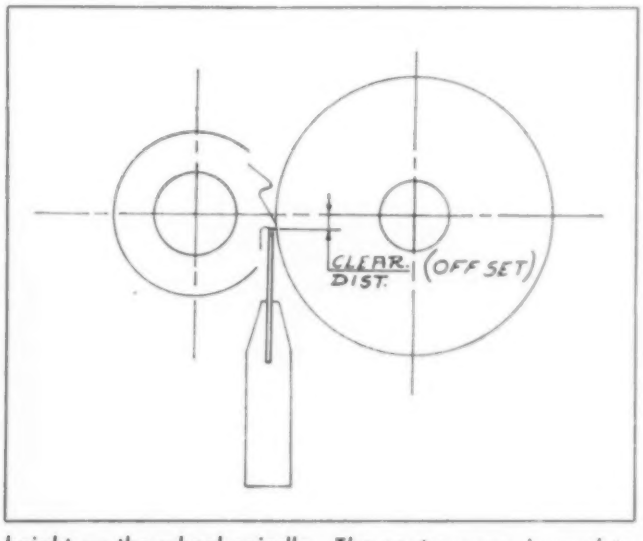




For all hole cutters a fast and accurate sharpening can be obtained by using the cutter bar and sliding shells. On all peripheral teeth with this set-up there is no need of table alignments, and the sharpening is straight and parallel.



Maintaining clearance in going from the small end to the large end of reamers is a big problem in tool rooms. Each reamer must be sharpened with its center at the same height as the wheel spindle. The center gage is used to make this adjustment. Clearance is then adjusted by raising or lowering the rest.



The Art of Tool Sharpening

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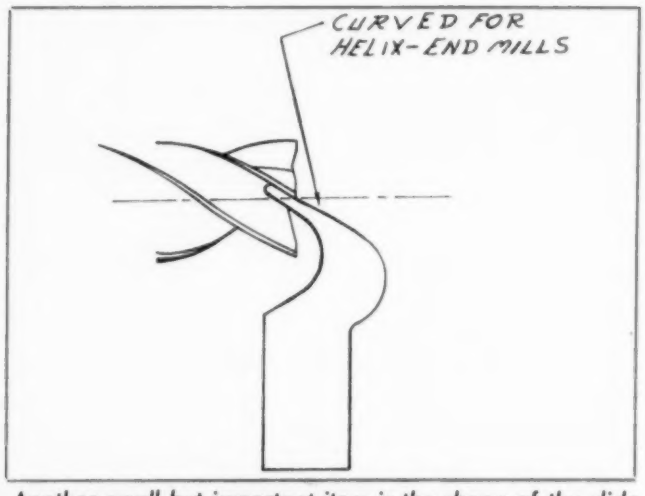
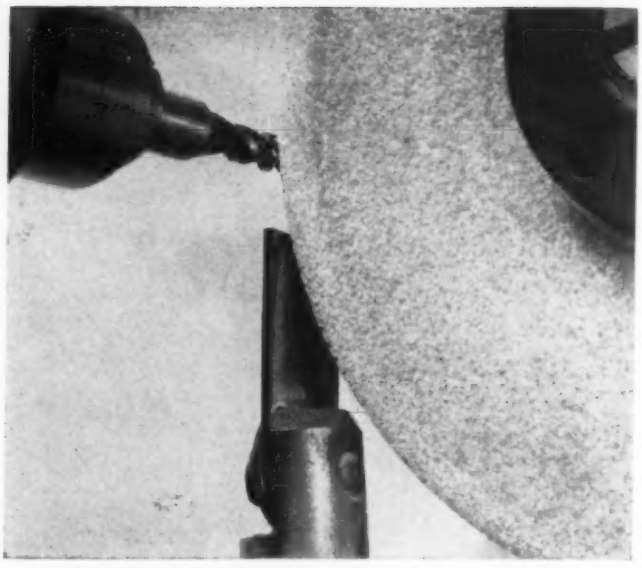
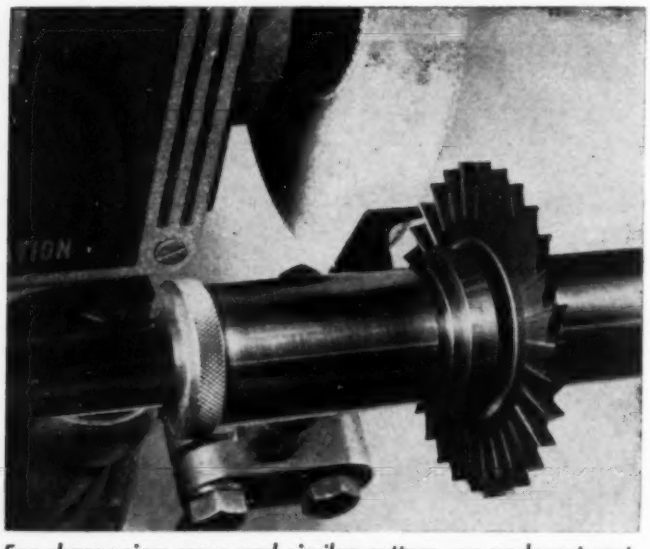
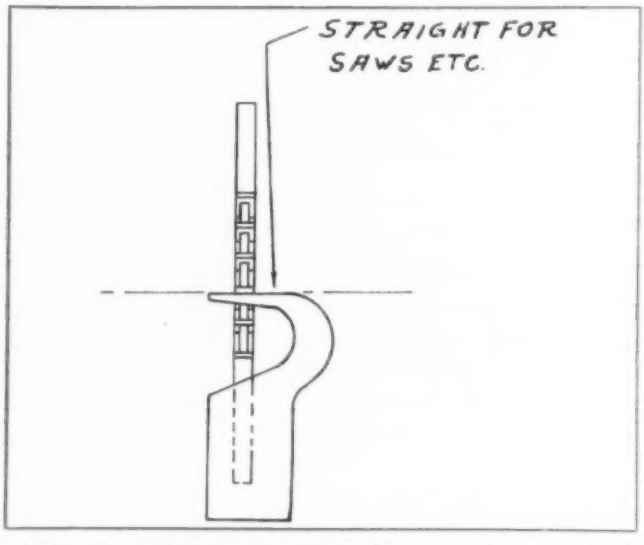


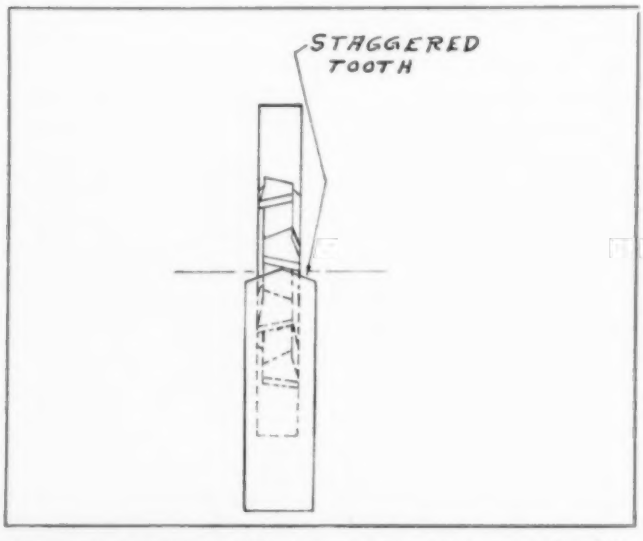
Another small but important item is the shape of the slide rest, three of which are illustrated on this page. For grinding a small multi-tooth end mill (above), the tooth rest is cut away to allow clearance for the previously ground tooth, and the angle of the rest follows the helix angle of the tooth.



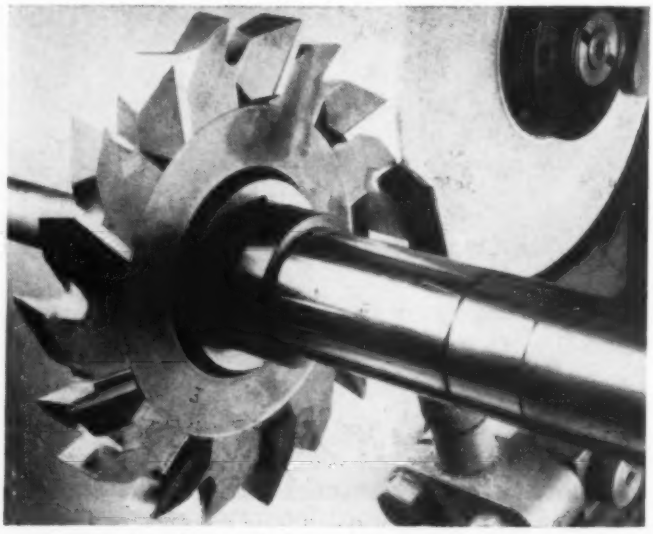


For sharpening saws and similar cutters, an undercut rest as illustrated above is recommended. The flat top of the rest allows for end movement of the saw in sharpening, while the undercut provides clearance for previously sharpened teeth.





Sharpening cutters with staggered teeth is expedited by a pointed rest like this one. A pointed rest allows clearance whether the tooth face slants to the right or to the left.



FOR PERIPHERAL CLEARANCE

NOMINAL DIAM. OF CUTTER	INDICATOR DROP MIN.	INDICATOR DROP MAX.	CLEARANCE ANGLE * MIN.	CLEARANCE ANGLE * MAX.	INDICATOR TRAVEL ON LAND ‡	WIDTH OF 1ST LAND (FOR END MILLS) MIN.	WIDTH OF 1ST LAND (FOR END MILLS) MAX.
1/16	.0022	.0030	22°	26½°	.010	—	.010
3/32	.0021	.0029	18°	22¾°	.010	—	.010
1/8	.0024	.0032	16°	19¼°	.015	.010	.015
5/32	.0025	.0033	15°	18¼°	.015	.010	.020
3/16	.0025	.0033	14°	17¼°	.015	.010	.020
7/32	.0026	.0034	13°	15¼°	.020	.010	.020
1/4	.0026	.0036	12°	15°	.020	.010	.020
9/32	.0027	.0037	12°	14¾°	.020	.010	.020
5/16	.0028	.0038	12°	14¾°	.020	.015	.025
11/32	.0029	.0039	11°	13½°	.025	.015	.025
3/8	.0031	.0041	11°	13½°	.025	.015	.025
13/32	.0033	.0043	11°	13½°	.025	.015	.025
7/16	.0034	.0044	11°	13½°	.025	.020	.030
15/32	.0034	.0046	10¾°	13½°	.025	.020	.030
1/2	.0034	.0046	10½°	13°	.025	.020	.030
9/16	.0034	.0046	10¼°	13°	.025	.020	.030
5/8	.0034	.0046	10°	12¾°	.025	.025	.035
11/16	.0034	.0046	9°	11¼°	.030	.025	.035
3/4	.0035	.0047	9°	11¼°	.030	.030	.040
13/16	.0036	.0049	9°	11¼°	.030	.030	.040
7/8	.0036	.0051	9°	11¾°	.030	.030	.040
15/16	.0036	.0051	8°	10½°	.035	.035	.050
1	.0037	.0052	8°	10½°	.035	.035	.050
1 1/8	.0037	.0052	7¾°	10½°	.035	.035	.050
1 1/4	.0037	.0052	7¾°	10¼°	.035	.040	.060
1 3/8	.0037	.0052	7½°	10°	.035	.040	.060
1 1/2	.0036	.0051	7¼°	9¾°	.035	.040	.060
1 5/8	.0035	.0050	7°	9½°	.035	.040	.060
1 3/4	.0034	.0049	6¾°	9¼°	.035	.040	.060
1 7/8	.0033	.0048	6½°	9°	.035	.040	.060
2	.0032	.0047	6¼°	8¾°	.035	.040	.060
2 1/4	.0018	.0038	5°		.040		
2 1/2	.0018	.0038	5°		.040		
2 3/4	.0019	.0039	5°		.040		
3	.0020	.0040	5°		.040		
3 1/2	.0018	.0038	4°		.050		
4	.0019	.0039	4°		.050		
4 1/2	.0019	.0039	4°		.050		
5	.0020	.0040	4°		.050		
5 1/2	.0025	.0045	4°		.060		
6	.0026	.0046	4°		.060		
7	.0032	.0052	4°		.070		
8	.0033	.0053	4°		.070		

FOR SIDE & END TOOTH CLEARANCE

FOR ALL CUTTERS WITH SIDE TEETH EXCEPT END MILLS

INDICATOR TRAVEL ON LAND	READING FOR 1½° CLEAR.
.015	.0004
.020	.0005
.025	.0007
.030	.0008
.035	.0009
.040	.0010
.045	.0012
.050	.0013
.055	.0014
.060	.0016
.065	.0017
.070	.0018
.075	.0020
.080	.0021

THIS TABLE INCLUDES SHELL END MILLS.

GRIND END TEETH CONCAVING .004 PER IN.

FOR END TEETH OF END MILLS (EXCEPT 2-LIP AND 3-LIP)

INDICATOR TRAVEL ON LAND	READING FOR 4° CLEAR.
.010	.0007
.020	.0014
.030	.0021
.040	.0028
.050	.0035
.060	.0042
.070	.0049
.080	.0056
.090	.0063
.100	.0070

GRIND END TEETH CONCAVING .004 PER IN.

FOR END TEETH OF 2-LIP & 3-LIP END MILLS

INDICATOR TRAVEL ON LAND	READING FOR 7° CLEAR
.010	.0012
.020	.0024
.030	.0036
.040	.0049
.050	.0061
.060	.0073
.070	.0086
.080	.0098
.090	.011
.100	.012

* THESE ANGLES ARE CONSIDERED CORRECT FOR ORDINARY STEELS, CAST IRON, ETC. FOR OTHER CLEARANCE ANGLES USE FORMULA

FORMULA:

$$\text{SIN CLEARANCE ANGLE} = \frac{\text{RAD.}^2 + \text{LAND}^2 - (\text{RAD} - \text{DROP})^2}{\text{DIAM} \times \text{LAND}}$$

RAD & DIAM ARE OF THE MILL BEING MEASURED.

CLEARANCE ANGLES USUALLY SHOULD BE INCREASED FOR ALUMINUM, COPPER, PLASTIC ETC.

‡ THESE FIGURES ARE FOR NEW MILLS WITH SECONDARY LANDS SHARPENED AFTER CHECKING CLEARANCE.

TABLE OF DIAL INDICATOR READINGS FOR TESTING PERIPHERAL & SIDE TOOTH CLEARANCE ON MILLING CUTTERS

METAL CUTTING TOOLS DIVISION
BROWN & SHARPE MFG. CO.
PROVIDENCE, R.I.
DATE 3-1-55 BY M.H.

REDRAWN WITH CHANGES

21A-51364

With the variety of end mills in use today, it is impossible for a man to remember the proper clearance for each type. Further, the clearances for side teeth and end teeth are often different. The ready reference chart above is suitable for posting, if there is not one in the shop.

For Critical, High Precision Grinding . . . Give The Operators Private Rooms

The Somma Tool Company did and boosted production and reduced scrap. Fatigue has been reduced and breakage and spoilage due to normal accidents have been almost eliminated.

By **M. M. Patterson**
Managing Editor

● Imagination can play as important a part in the building of a new plant as purely economic and practical considerations. Such is the case in the design and layout of the new Somma Tool Company plant in Waterbury, Connecticut, where imagination has increased productivity 10%, reduced scrap and fostered a happy employee-employer bond. This was accomplished by giving each precision grinder operator a private office!

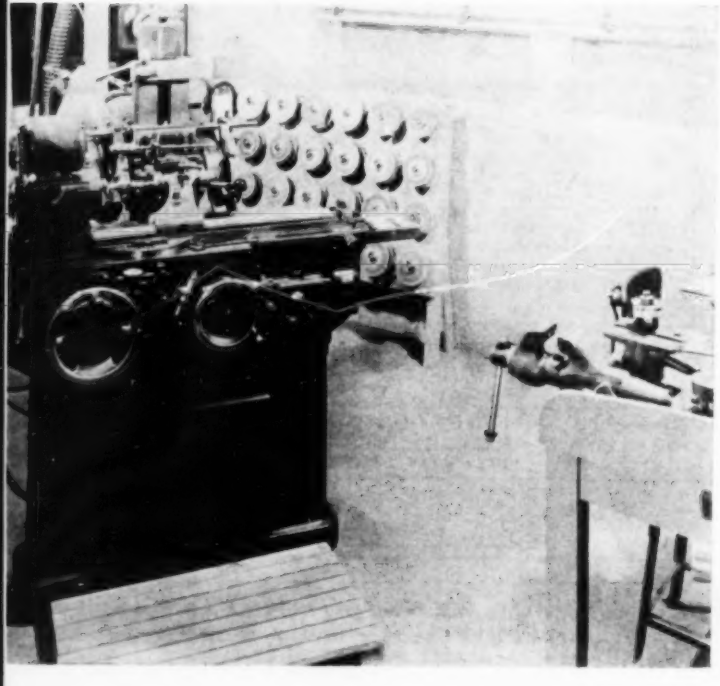
The Somma Tool Company manufactures precision form tools, many of them special and designed to exacting specifications. When the growth of the Somma enterprise necessitated enlarged quarters the new plant was designed to eliminate the biggest drawback to efficient production: shop noises; outside interference factors which accounted for scrap; variables in temperature and human tensions resulting from the critically close grinding operations. Formed tools, as is well known, require careful blending of forms, close radii and highly critical angles. Work is usually in tenths. Skill is the key to efficient production.

Bar stock is received in the new plant at the back of the plant where rough cutting operations are performed before the stock is moved to the center of the shop for general machining and thence to the rough grinding section or to the precision grinding offices. The central area of the shop is for the general machining operations, the grinding rooms are ranged along the two outside walls of the plant.

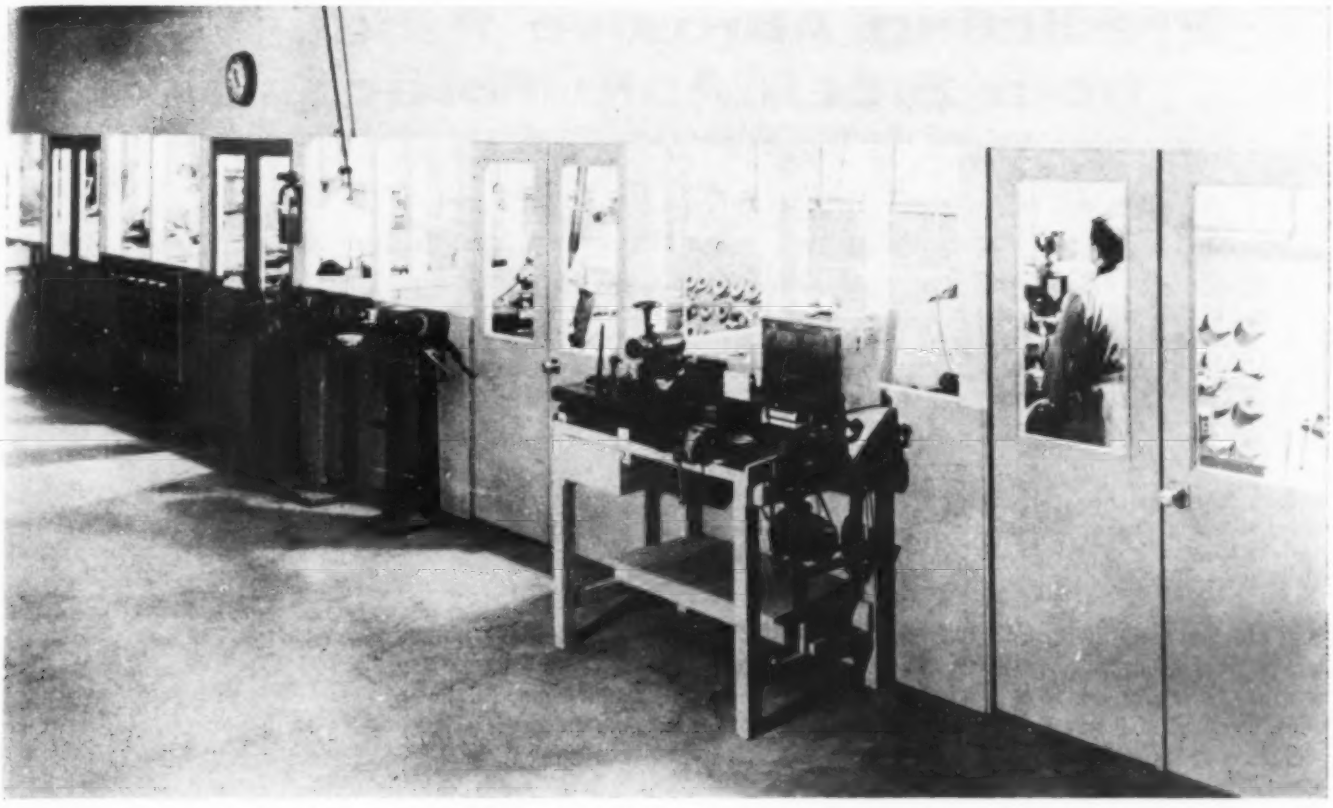
There are ten grinding rooms in all. Each room is 12 X 12 feet and completely soundproofed. Ceiling is of fiber glass, the walls are supplied with dead space for additional sound proofing. The ear plays a mighty important part in close precision grinding. As Mr. Somma pointed out, the operators literally play their work by ear. The rooms, from a noise standpoint, are completely separated from the rest of the shop. In the previous plant the operators were too often distracted by the heavier machining and grinding noises, which played havoc more than once with critically close work. When a forming tool can take as long as 20 hours to finish one can well imagine that a piece of scrap at the end of the 18th hour is definitely not desired. The new grinding rooms have eliminated most of this danger.

Each room is equipped with its own rack of wheels especially selected to meet the requirements of any job which comes into the shop. There is no exchange of wheels between the rooms, each man becomes used to his wheels and handles them with the skill of a violinist using his bow.

Wheel dressing accessories are standard equipment in every room so the operator can dress his wheels to the tolerances and forms required, in-



Each room is kept clean by its occupant. Precision inspection devices and comparators, as well as a diversified wheel selection to meet all requirements, are standard equipment.



A view of several of the grinding rooms. Elimination of distracting shop noises have increased productivity and decreased work spoilage. There has been a noteworthy reduction in physical and mental fatigue of the workers.

cluding audible control which is necessary in the finished trueing. An additional benefit from the insulation of the operators and the operation from outside shop noises is the reduction in the fatigue factor, both physical and mental, which generally results from the high degree of concentration required on close tolerance work. As a consequence of this a 10% productivity has been noted at the Somma plant; the psychological benefit to workers is noteworthy. There is a fine pride in workmanship.

Each operator is responsible for his own room, performing his own housekeeping, guarding his work in progress as well as his precision gages and wheels. It must not be assumed that the operators were careless prior to moving into the new plant, we are all familiar with the damage which is constantly being caused by accidents, the majority of them unavoidable, and a necessary concomitant of the average shop. These accidents have been reduced.

Each room contains a complete set of inspection instruments and a comparator. Each operator is responsible for checking his work. One large, master grinding room contains master projection and inspection equipment for testing the accuracy of all other inspection equipment in the plant.

Among the other special features of the new plant is a closely controlled temperature system which entirely eliminates any slight errors which might occur from variations in temperature while work is in process. Each of the individual high precision grinding units has an exhaust system for removal of dust. This is returned to two large central dust separation and filter tank units and the air is completely purified and re-circulated in order to maintain the temperature level, rather than exhausting the air to the outside and bringing in outside air which might be of a different temperature than the controlled internal ambient.

A two way inter-com system is installed in each of the individual grinding rooms. The large number of orders in process and the close tolerances required on almost all of them plus the urgency of delivery in most instances make necessary a very close control of all work in process. Starting with a central work schedule to locate the jobs, questions on delivery, specifications, and other vital information can be exchanged rapidly without disturbing other operators and without the delays usually involved in running back and forth to the office.

And so, by the simple expedient of appreciating the problems faced by the grinding craftsman, the Somma people planned their building with his problems in mind. Increased productivity, less spoilage, reduction in errors and re-do work, greater satisfaction and a higher degree of physical and mental fitness due to the absence of distracting outside noises have been the reward for workers and the owners. For the customers, consistently reliable tools delivered when needed; for the other workers (we can only speculate on this) possibly a desire to learn more of the grinding trade so that they may one day graduate to a private room of their own. • • •

Predicting Abrasive Production from Steel, Auto Forecasts

- √ *Combined steel, motor vehicle production shows up well for predicting both aluminum oxide, silicon carbide tonnage.*
- √ *No significant correlation between abrasive and stainless or alloy steel production*
- √ *Foresee 215,000-226,000 tons of aluminum oxide, 54,000-76,000 tons of silicon carbide for 1959.*

By **Otto L. Forchheimer**
Senior Research Chemist
General Abrasive Company

● Abrasive manufacturers have traditionally looked to Pittsburgh, Chicago and Detroit for their economic weather forecasts. Or, to put it another way, "As steel goes, so go abrasives."

Such published information as exists on this subject appears to support this assumption. Figure 1 for instance, shows steel shipments and the amount of silicon carbide and aluminum oxide "shipped or used" for the years 1933 to 1957. This analysis, similar to that published annually by the U. S. Bureau of Mines in their *Minerals Yearbook*, shows sympathetic movements for these commodities. It is worthwhile, however, to examine these correlations further to determine the extent to which the variations in these commodities merely follow the general level of business activity or whether there is a closer relationship between them.

If a good correlation exists, it confirms the assumption that the manufacture of abrasive materials is closely tied to the steel industry and verifies the cyclical nature of the abrasive business. Further, since predictions of the level of steel production for various time periods in the future are readily available, it should become possible to use these to forecast abrasive sales over such time periods. Such information would be valuable to the management of abrasive producing companies. In this instance, the investigation has been restricted to aluminum oxide and silicon carbide abrasives.

Since it has also been assumed that a considerable fraction of aluminum oxide abrasive is used for the production of stainless and alloy steels, it appeared useful to attempt correlations between these specialty steels and abrasive production in the hope of attaining a better correlation than with steel production as a whole. Finally, in view of the considerable amount of abrasives used in the automobile industry, the correlation between abrasive production and motor vehicle production was also explored.

Testing Correlations

The usual statistical techniques for simple correlations were used. Only generally available data were considered useful in order that the reader may make any extensions necessary to his own situation. Volume figures, such as tons of abrasive and steel, were used in preference to dollars to avoid effects of price changes.

The degree of correlation, r^2, can have values from 0 to 1; 0 indicates a complete lack of correlation, 1 would mean that variations in one variable completely determine the variations in the other variable. The formula for calculating r^2 is the following:

$$r = \frac{\Sigma X_1 X_2 - \frac{\Sigma X_1 \Sigma X_2}{N}}{\sqrt{\left(\Sigma X_2^2 - \frac{(\Sigma X_2)^2}{N}\right)\left(\Sigma X_1^2 - \frac{(\Sigma X_1)^2}{N}\right)}}$$

where X_1 and X_2 indicate values for the two variables (X_1 is used for abrasive in this work) and N is the number of observations included in the calculation.

The standard deviation is a statistical device for setting upper and lower limits on the range for a predicted value. There is a 67% probability—in other words, two chances out of three—that the actual value will fall within one standard deviation of the estimated value. As the degree of correlation improves, the range narrows. Hence, the 65% correlation resulting from the comparison of aluminum oxide and motor vehicle production produces a much wider range than the 80% correlation between silicon carbide and motor vehicles.

Prior to calculating r^2 the data are usually inspected in the form of a scatter diagram (such as Figure 2) where X_1 is plotted against X_2. The presence of a strong trend in the points will indicate a good correlation. Where a good correlation is indicated, as in Figure 4, a least squares line for the points can be calculated. This equation will be of the form

$$X_1 = bX_2 + A$$

and expresses X_1 in terms of X_2 as determined by the data. This is the equation which is used for predictions of values of X_1 (abrasive crude shipped or used)

in terms of X_2 (expected levels of finished steel shipments or vehicle production). It is clear that such predictions consitute an extrapolation of the data used in obtaining the equation and proper care must therefore be taken that technological changes have not altered the picture.

In the case of the comparison between abrasive crude and finished steel shipments, a high degree of correlation was obvious from the scatter diagrams (Figures 2 and 4). A complication was encountered in attempting a comparison to vehicle production in that motor vehicle production was abnormally low during the war years, whereas production of other metal products requiring abrasives was higher. The correlation shown in Figure 3 was obtained by disregarding the data for the years 1942 to 1946, as well as for 1951 and 1952. Nothing significant resulted from attempting to find correlations between abrasive shipments and shipments of finished stainless and alloy steel products. Since considerable snagging is involved in the manufacture of these specialty steels, it seemed likely that a correlation between

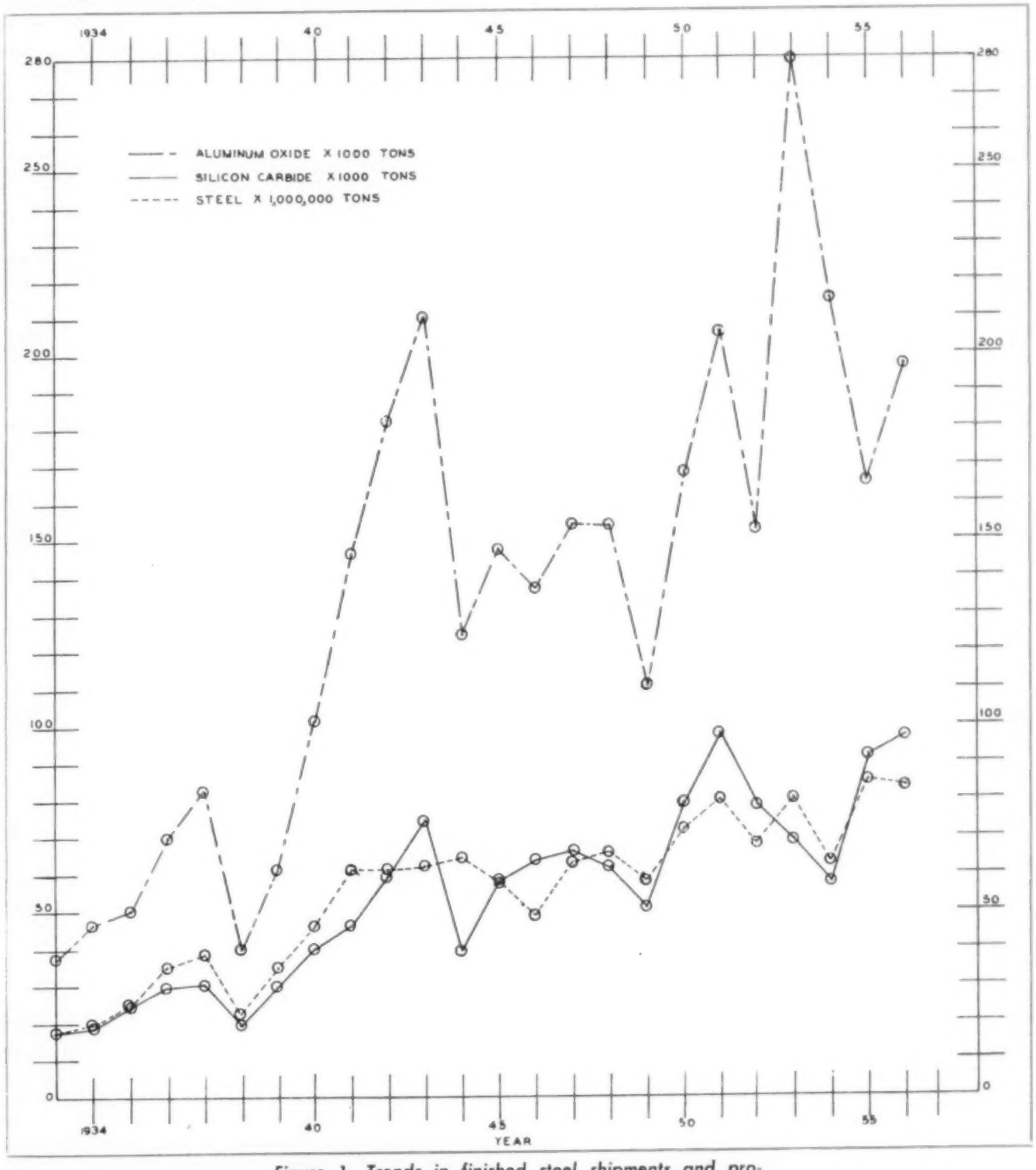


Figure 1. Trends in finished steel shipments and production of abrasive crude.

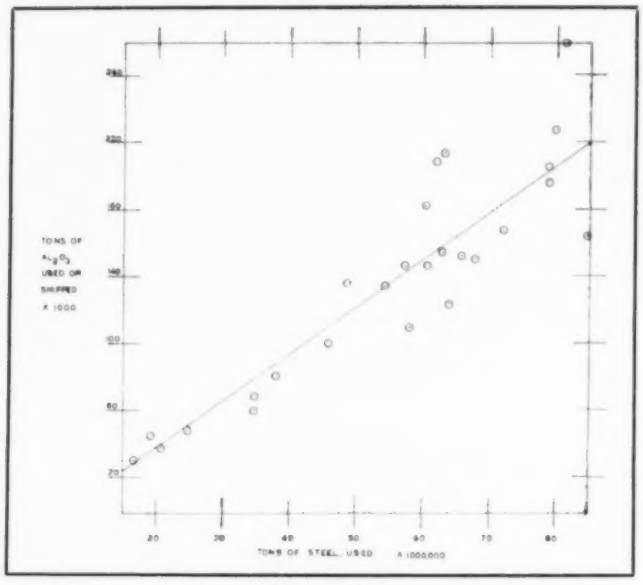


Figure 2.

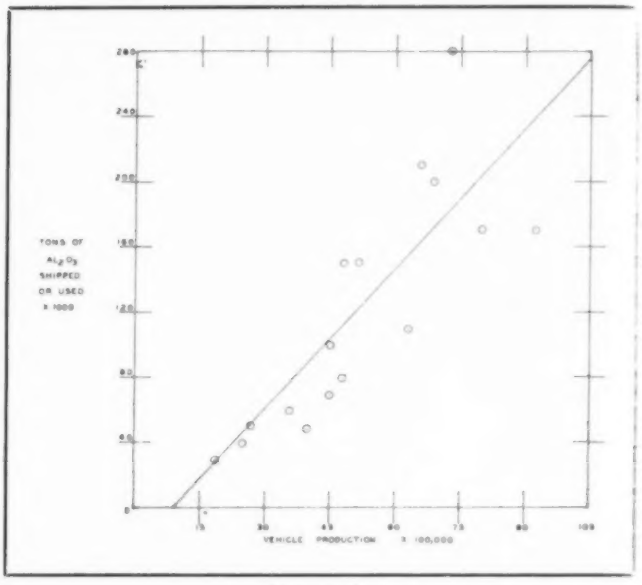


Figure 3.

these and aluminum oxide crude might be in the cards. However, none of the scatter diagrams involving specialty steels showed much correlation, and for this reason the data were not further developed.

On the other hand, it would be dangerous to assume that there is no correlation between abrasives and alloy and stainless steels. Their production forms only a small fraction of the whole and is occasionally limited by capacity. The situation suggests a possibility that the proportion of aluminum oxide used for specialty steels is not as high as has been assumed. If it were appreciable in its effect on the total, a better correlation should have resulted. On the basis of the data used in this study, these correlations do not appear to be good enough to be useful in predicting abrasive production.

Results

All calculations were made using only two significant figures. In using the equations derived only two significant figures need to used, but care needs to be taken in the placement of the decimal point.

1. *Aluminum Oxide vs. Total Steel (Figure 2)*
   Equation for line of estimation:
   $$X_1 = 1.87 + 0.282X_2$$
   where X_1 is the number of tons x 10^{-4} of aluminum oxide used or shipped, and X_2 is the number of tons of steel shipped x 10^{-6}.
   Standard deviation for the estimate by the above equation is 27,000 tons.
   The degree of correlation (r^2) is 0.795.
   This means that 80% of the variation in aluminum oxide shipments is accounted for by variations in steel shipments, with a 67% probability that the actual production will be within a range of 27,000 tons above or below the predicted production.
2. *Silicon Carbide vs. Total Steel (Figure 4)*
   Equation for the line of estimation:
   $$X_1 = 5.8 + 1.095X_2$$
   where X_1 is the number of tons x 10^{-3} of silicon carbide used or shipped, and X_2 is the number of tons of steel shipped x 10^{-6}
   Standard deviation for the estimate by the above equation is 10,000 tons. The degree of correlation (r^2) is 0.833.
3. *Aluminum Oxide vs. New Vehicle Production (Figure 3)*
   Equation for line of estimation:
   $$X_1 = -2.54 + 0.286X_2$$
   where X_1 is the number of tons x 10^{-4} of aluminum oxide shipped or used, and X_2 is the number of new vehicles produced x 10^{-5}
   Standard deviation for the estimate by the above equation is 63,000 tons. The degree of correlation (r^2) is 0.654
4. *Silicon Carbide vs. New Vehicle Production*
   Equation for line of estimation:
   $$X_1 = 10.8 + 1.15X_2$$
   where X_1 is the number of ton x 10^{-3} of silicon carbide used or shipped, and X_2 is the number of new vehicles produced x 10^{-5}
   Standard deviation for the estimate by the above equation is 11,000 tons. The degree of correlation (r^2) is 0.805

Comparison with Economy

In order to test the possibility that these correlations are merely a reflection of the economy, as such, the degree of correlation for abrasive shipped or used with the Gross National Product (in constant dollars) was calculated for the years 1940 to 1956. The results were as follows:

For aluminum oxide $r^2 = 0.50$
For silicon carbide $r^2 = 0.47$

The correlations between abrasives and steel and between abrasives and motor vehicles are appreciably closer than the 50% correlation between abrasives and the Gross National Product. Although the trend for abrasives is upward along with the economy, the cyclical variations are sufficiently strong so that a comparison with a cyclically dependent commodity such as steel or motor vehicles is more meaningful. A de-

monstrable connection between abrasive and steel production and between abrasives and motor vehicles exists and the cyclical fluctuations of one are reflected in the other, as the data and the calculations indicate.

What does it mean?

In developing these statistical relationships no causal relationship between the variables need exist. Correlations can result from chance, and are consequently not predictable. For example, a higher degree of correlation is found between silicon carbide and vehicle production (80%) than between aluminum oxide and motor vehicles (65%) in spite of the fact that aluminum oxide is more closely associated with the grinding steels.

This high correlation of silicon carbide with steel and motor vehicle production is one of the interesting aspects of this analysis. It occurs in spite of the fact that a growing percentage (40 to 45% in recent years) of silicon carbide has been going into products other than abrasives. However, a high proportion of these non-abrasive uses, such as refractory and metallurgical, are closely tied to steel, whereas a considerable fraction of the abrasive uses are not.

A limiting factor to the use of this type of technique is the fact that we are bound by the use of definite cut-offs in having to take finite time periods. There is no doubt a time lag in the variations of abrasives and the other commodities. Today's abrasive grinds tomorrow's steel and the next day's automobiles.

The statistical correlations found between abrasives and steel production and between abrasives and motor vehicles are good. They should be useful in making predictions of the level of abrasive sales provided good estimates of steel production and motor vehicle production can be obtained, and these are readily available.

What does this mean for 1959?

Recent estimates, as reported in a number of trade journals and newspapers indicate a total motor vehicle production in 1959 approximating 6.6 million units and a total steel production of 110 to 125 million tons of ingots.

Using the equation and standard deviation already calculated for aluminum oxide vs. new vehicle production ($X_1 = -2.54 + 0.286X_2$, plus or minus 63,000 tons) aluminum oxide production can be predicted to be approximately 163,000 tons, with a 67% probability that actual production will fall between 100,000 and 226,000 tons.

This range, however, is too wide to be really useful. It can be verified and reduced by a cross-check with steel production. By translating various estimates of ingot production for 1959 (110 to 125 million tons) into figures which can be used in our equation, a range of 215,000 to 246,000 tons of aluminum oxide for 1959 is predicted. This range can be narrowed down as closer estimates of steel production are made. The overlap between the prediction based on steel and that based on motor vehicles should serve as the most useful guide in predicting aluminum oxide for 1959. This range is 215,000 to 226,000 tons.

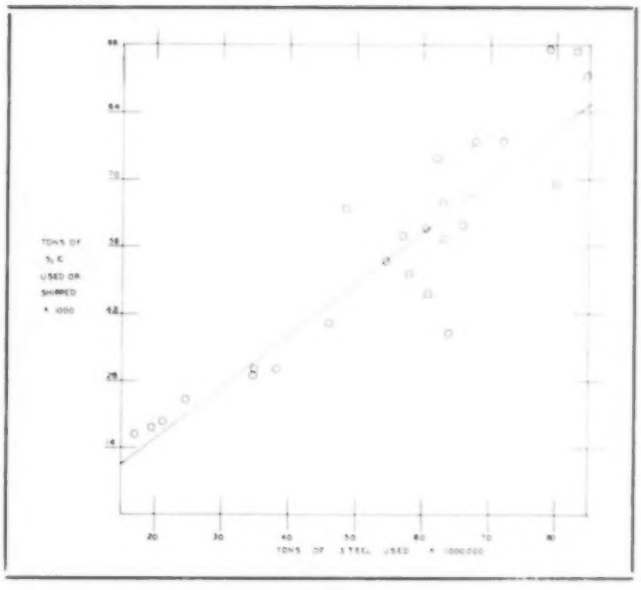


Figure 4.

On the same basis we can predict that 65,000 tons of silicon carbide will be shipped or used in 1959; there is a 67% probability that the actual value will lie between 54,000 and 76,000 tons. The range for silicon carbide is much narrower than that for aluminum oxide, a reflection of the higher degree of correlation.

In 1954 6.7 million motor vehicles were produced, making it a good year for comparison with 1959 as projected. In 1954 215,000 tons of aluminum oxide and 58,000 tons of silicon carbide were shipped or used. Both these values are within the predicted ranges for this volume of motor vehicle and steel production.

Using the results of this work will yield only a figure for total abrasive production in tons. Any firm in the field will have to make its own prediction of the percentage of available business it will get. It will further have to build a backlog of data over a number of years in using these relations in order to discover how its product mix will translate tonnage figures into dollar sales volume. Even the tonnage figures can be useful to production departments without previous use of these estimation equations, when viewed in the light of past experience in sales ratio of various types of aluminum oxide and silicon carbide. An analysis of the correlations of a company's major products with the independent variables suggested here or others which might give even closer correlation can easily be accomplished by the technique suggested. Attention must be paid to the variation in the product mix with cyclical fluctuations; as an example, grinding wheel sales vary more with economic conditions than do coated products. Close observation of the time lag between shifts in steel or motor vehicles and the products of any particular abrasive manufacturer may indicate changes in the level of production several months in advance, giving better opportunities for planning and resulting in lower overall costs. • • •

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But HANDLE WITH CARE

By **Richard L. McKee**
Associate Editor

• There is no such thing as an unbreakable grinding wheel. A wheel may look tough and hard. Mounted properly, it may act tough, tearing off metal at a rate well above one hundred pounds per hour. At operating speeds, a wheel—even a relatively slow one—travels at a pretty fast clip. But it really isn't tough. It needs to be handled with care if it is to give the user the kind of service he deserves.

It isn't quite accurate to call grinding wheels fragile, either. Yet it would be foolish to deny that an element of fragility exists. Wheels are particularly susceptible to chipping or cracking as a result of a sudden bump or drop. The word is, in fact: "Never use a wheel that has been dropped."

The ASA Safety Code for *The Use, Care and Protection of Abrasive Wheels* lists three 'musts' for handling:

(a) Handle wheels carefully to prevent dropping or bumping.

(b) Do not roll wheels (hoop fashion).

(c) Use trucks or suitable conveyors which will provide proper support for all transportation of wheels which cannot be carried by hand.

A special hand truck for grinding wheels and some precautions taken to prevent dropping and bumping of wheels at the Tractor Works of International Harvester Company in Chicago are described below.

The hand truck in the right-hand photo is thirty-two inches wide. Since the largest grinding wheel in use in the plant is thirty inches in diameter, there is little chance of hitting a wheel in transit against a machine or other projection. The wheels of the truck, of course, have hard rubber tires, and all surfaces of the truck that come in contact with a grinding wheel are covered with rubber. When the hand truck is in normal traveling position, the grinding wheel is tilted safely against the back of the truck. It should be noted also that the cable sling on the hoist has a rubber hose long enough to prevent the cable from coming in contact with even the largest of wheels used in the plant.

For the best service from your grinding wheels, HANDLE WITH CARE. They're not as rugged as they seem to be. • • •

Special hand truck and cable sling for grinding wheels. The operator is lifting a 30"x5"x20" dish-type wheel from the truck before giving it the "ring" test. (Photo courtesy International Harvester Company.)

Ten-year-olds really shine on Sunday

We're referring not only to juvenile cyclones, but also to those 10-year-old (and older) machine tools that are undermining production efficiency in plants everywhere. On Sunday your machines are idle – and it's the only day of the week the old ones are not losing money for you. Chances are that a performance comparison of your present surface grinding equipment with modern Blanchard grinders will open your eyes. Because unless your plant is an exception, it's safe to say that *your* surface grinders are obsolescent . . . are penalizing your production efficiency every working day. Find out how modern Blanchard grinders, equipped with Blanchard wheels, can boost production, improve quality and cut costs for *you!* Your Blanchard distributor is an expert in the field of grinding. On request he will gladly make an honest, accurate appraisal of the efficiency of your grinding production. Write or phone today.

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Wall Chart Aids Grinding Efficiency

By **Clement F. Brown**

• An important element of optimum grinding efficiency is wheel speed. This speed is expressed in terms of surface feet per minute (sfpm) with respect to the type of grinding wheel or revolutions per minute (rpm) as related to the wheel's diameter. Maximum peripheral speeds for all types of wheels are fixed by safety rules and regulations. To maintain efficiency, rotary speeds must be increased as the wheel's diameter is worn down.

Floor operations—where portable grinders are used for snagging and cleaning operations on parts such as castings and weldments—are usually more difficult to control in this respect than machine grinding operations. Operators sometimes wear a wheel down to the point where efficiency is almost nil—as related to the speed of the portable equipment they are using.

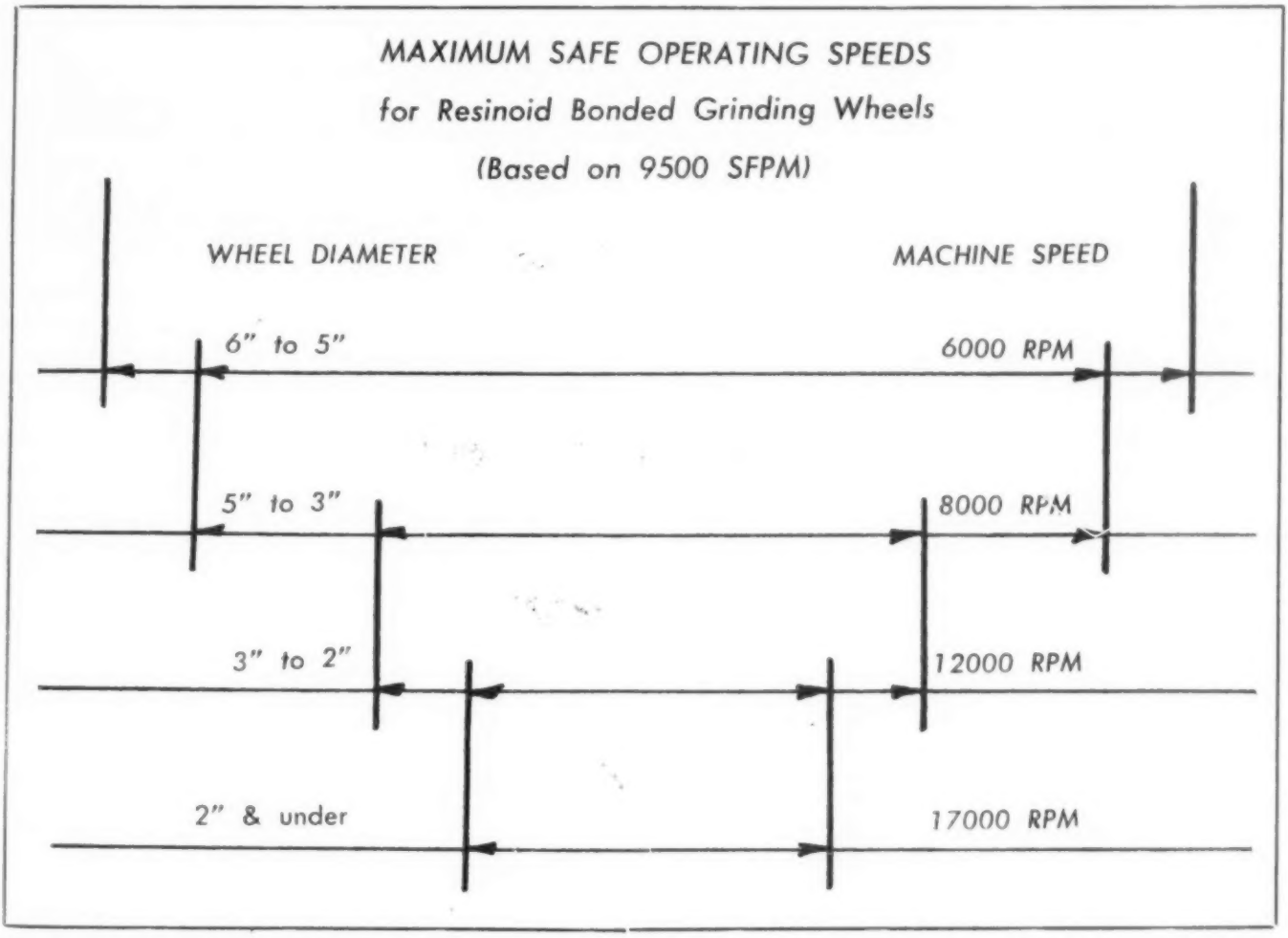
An ideal point of control for this situation is the toolroom. As grinders are turned in at the completion of an operation or shift, wheel size should be checked by the attendant. As wheels wear, they can be transferred to higher speed (and lighter duty) machines.

To aid in this control, a simple wall chart serves to good advantage.

The chart shown below is laid-out to check wheel sizes for resinoid bonded wheels. Maximum safe operating speed for this type of wheel is 9500 sfpm. This particular chart was designed for a shop with four sizes of portable grinders with speeds of 6000, 8000, 12000 and 17000 rpm.

The diameter of any machine mounted wheel can be checked with calipers and the size compared with the lined areas on the chart. Unmounted wheels can be placed directly on the chart.

For your own particular toolroom, the gauging chart can be modified to suit your standard portable grinders and the wheel sizes commonly used. • • •



Wall chart for checking wheel diameter against the speed of portable grinder on which it should be mounted for most efficient use. Unmounted wheels may be placed directly on the chart for comparison. Copies of this chart printed on thin cardboard and suitable for mounting on the wall of your toolroom are available on request.

Correct Adapters for Depressed Center Wheels

✓ *Positive contact between rim of adapter and grinding wheel before and after adapter nut is tightened.*

✓ *Slight clearance at sides and bottom of adapter recess before adapter nut is tightened.*

By **W. F. Parsons**
Product Safety Engineer
Bonded Abrasives Division
The Carborundum Company

● Within recent years, the depressed center reinforced abrasive wheel has been gaining increasing popularity in industry for such applications as cutting and smoothing weld bead, flame-cut edges and castings. Reinforced with layers of a strong fabric, glass fiber being one of the most common, these wheels combine efficient grinding action with a considerable margin of safety. Their place may be said to have been formally recognized when the shape was designated as Type 27 in the most recent revision of Standard Shapes and Sizes of Grinding Wheels, Simplified Practice Recommendation R45-57.

The operation of this type of wheel on existing equipment has led to the development of various types of machine mounts or adapters. However, on some grinders difficulties have been encountered with vibration caused by wheel runout. In other instances there have occurred occasional breakages that could be definitely traced to the manner in which the wheel was mounted. Field observations indicated some tentative reasons for and methods of correcting the difficulties, warranting the tests whose results are reported below.

Procedure

Four groups of wheels, two with all-metal adapters, two with adapters faced with a resilient rubber compound, were tested. For each type of adapter, the wheels of one set were mounted with positive contact around the rim of the adapter and clearance around and under the wheel center in the recess of the adapter, as recommended. Wheels of the other set had contact with the adapters only at the bottom of the recess.

During the test, each wheel was run at operating speeds in an enclosed box. A piece of ¾″ x ¾″ angle iron ¼″ thick was mounted on a lever arm which extended through an opening in the box enclosure. The angle iron was so arranged that it struck the side of the revolving wheel, near the periphery, with impact blows of 55 foot pounds. This test, while it was more severe than wheels ordinarily encounter in use, served to show in a relatively short time the effect of adapter support on various areas of the wheels.

Results

The material for the adapter made no significant difference. Both all-metal and resilient-faced adapters proved to be adequate with respect to the support provided. For both types of adapters, when there was positive contact around the rim of the adapter and the recommended clearance on the sides and bottom of the depressed center, all wheels tested withstood 25 impacts without breaking. Where there was contact only in the recess of the adapter and clearance around the rim, all wheels broke with 25 or fewer impacts.

Recommended mounting conditions

The results of these tests, further confirmed by field trials under working conditions, indicate that the following conditions are requirements for correct mounting of reinforced wheels:

1. There should be positive contact between the wheel and the outer face or rim of the adapter, shown as Area "A" in Figure 1.

2. To insure this contact, a slight clearance of .001″ to .005″ should exist between the depressed center of the wheel and the bottom of the recess in the adapter before the adapter nut is tightened. This clearance is shown in Area "B" in Figure 1.

3. Clearance of approximately 1/32″ should be provided between the hub of the wheel and the side wall of the adapter, shown as Area "C" in Figure 1. This is to insure that there is no binding in this sidewall area that would interfere with proper seating of the wheel in the adapter. • • •

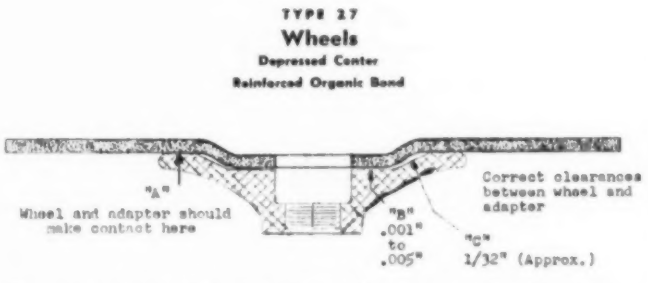


Figure 1. Type 27 reinforced wheel and adapter, showing contact and clearance areas before adapter nut is tightened.

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How to Use Coated Abrasives Safely

By **Wilbur E. Kidder**
Safety and Security Manager
Behr-Manning Company

● Coated abrasives are a relatively safe grinding medium. For so many years the emphasis in the field of abrasive safety has been directed toward bonded abrasives that there may be a danger of forgetting the hazards that do exist in the use of "sandpaper."

These hazards are neither so numerous nor so potentially dangerous as those involved in the use of grinding wheels. Breakage of a belt or a disk can be troublesome, of course, but because of the relatively small mass involved in comparison, for instance, with grinding wheels, lighter guards are usually adequate.

Disk sanding. Note the guard over the back part of the disk. The operator is wearing a leather apron and a face shield.

The Abrasive

Coated abrasives consist of abrasive grain bonded to a backing with an adhesive. The grain is most often aluminum oxide or silicon carbide, though lesser amounts of garnet, flint, emery and other natural abrasives are used. The backing may be either cloth, paper, fiber or some combination of these three. The adhesive is usually glue, resin or a combination of these, with some varnish also used. Though coated abrasives are used in the form of sheets, disks, sleeves, and other shapes, by far the greatest industrial use is in the form of belts of a wide variety of lengths and widths. Generally coated abrasives are used with some kind of back-up for the grinding area—a contact wheel, a drum, a pad, a platen, or a similar support. Some so-called "slack-of-belt" grinding, however, is done on unsupported belts.

Breakage of the belt or disk is probably the most likely hazard, so far as the abrasive is concerned. Most machines are built to operate at a speed within the safe limit for the abrasive, but failure of the abrasive most commonly occurs from the tearing or snagging from some other cause than speed. If it should be desirable to use speeds significantly higher than normal, for some special purpose, the recommendations of the manufacturer should be obtained and followed. It may also be advisable to make test runs or set up special safe-guards.

When a disk is used with a flexible pad on a portable grinder, flexing of the disk occurs, since much of the grinding is done on the edge of the disk. This may result in the snagging or tearing of the disk on rough edges.

Conditions of storage affect the strength of many coated abrasives. If the storage space is too hot or too dry, the abrasive tends to dry out, become brittle, and thus far more subject to breakage. To assure maximum strength and production, the manufacturers' instructions for proper storage should be closely followed.

Coated Abrasive Machine Hazards

Most of the hazards of coated abrasive machines are those of machines in general; relatively few arise directly from the use of the abrasive. Thus,

✓ *Be sure the exhaust system is adequate.*

✓ *Guard against combustion of flammable dust and swarf.*

✓ *Provide safety goggles or a face shield, and other protective equipment as needed, for the operator.*

for instance, V-belts should be covered, motor frames grounded, and electrical equipment and controls properly designed and installed. Further, since sanding is often done at high speeds, all machines should be properly adjusted, well lubricated and in good working order generally. This, it should be noted, is important for the quality of the finished product as well as for safety, since vibration in almost any part of the machine may affect the quality of the finished surface of the work.

On most belt sanders the belts are enclosed, except for the point of operation, and the enclosure tends to confine the dust and grit and to protect the operator in case of breakage. The design of the enclosure should permit ready access for easy adjustment of the machine and replacement of the belt. The guard should not interfere with the sanding operation, and the natural flow of abraded material should be into the enclosure. Open belts may sometimes be required, but the reasons for such an application should be carefully examined to make sure that they are valid.

Since swarf and other dust resulting from the grinding may be flammable, the machine should be designed for easy access, so that it may be kept clean. Where flammable coolants are used, precautions must be taken to prevent ignition of the coolants, and to extinguish the fire if one starts.

The dust and swarf hazards also make the design of ducts particularly important. The inside of the ducts should be smooth, with no metal screws on which material can catch; there should be a screen, within reach of the operator, to prevent pieces of coated abrasive from entering the exhaust system and clogging it. A system of sprinklers or similar protection in the ducts is desirable in any case, and essential when flammable materials are to be ground.

Swing-frame belt grinders require much the same protection as swing-frame wheel grinders, excepting that the belt guards need not be as heavy as the wheel guards. The exhaust installations are similar in both instances.

Portable grinders offer a couple of unique hazards. Like all portable tools, these grinders should be adequately grounded, regardless of voltage. The starting switch should be recessed or protected, and should be of a type which requires constant finger pressure to keep the circuit closed. On flexible shaft machines, where the starting torque is often severe, it may be advisable to start the machine in a special fixture to absorb this torque.

Protective devices on coated abrasive machines offer few unique problems. Often the exhaust hood provides the major share of the protection required. There are, however, three general objectives to be attained.

There must be sufficient protection against dust, including proper exhaustion of dust and measures to control a fire if it should occur.

There must be adequate guards for the operator—barriers to prevent his nipping his fingers in feed rolls, devices to insure that the machine will not

A well-enclosed and exhausted belt sander for off-hand work.

be started while it is being adjusted or while a belt is being changed, and on portable grinders, a guard on the back of the disk to protect against flying pieces of the disk.

There must be guards sufficient to protect the operator, other nearby workers and passersby against sheets which might be thrown from the outfeed end of a strip grinder or small parts which might be thrown from a cleated belt or a magnetized face plate. This usually involves the enclosure of a space at the outfeed end of the machine, in which no one is allowed while the machine is running.

Hazards Connected With The Work Pieces

The principal precautions related to the material being worked on involve control of the pieces being sanded, protection against combustion of materials which become flammable in finely divided particle form, though they are ordinarily nonflammable, and precautions against sanding of metals and flammable materials on the same equipment.

A jig or other mechanical or magnetic devices, of sufficient strength to hold even under an unusually heavy cut, should be used to hold the workpieces. If off-hand sanding cannot be avoided, then the operator should be instructed to hold the piece firmly and to exercise care in the grinding of sharp corners or other places where snagging may occur.

Magnesium, zirconium, aluminum and titanium are perhaps the most common of the metals which are ordinarily nonflammable, but which become flammable in powder form. Machines used for sanding magnesium should not be used for any other purpose; further precautions for the sanding of this material are too long to be detailed here, but are covered in the National Safety Council's Data Sheet D-426, *Magnesium*. Similar to this is the recommendation that wood, rubber and similar flammable materials should not be sanded on machines used for grinding spark-producing metals, nor even on machines connected to a common exhaust system with machines on which metals are sanded. The increased flammability of materials in powdered form is one of the principal reasons for guarding ducts against fire, as indicated above.

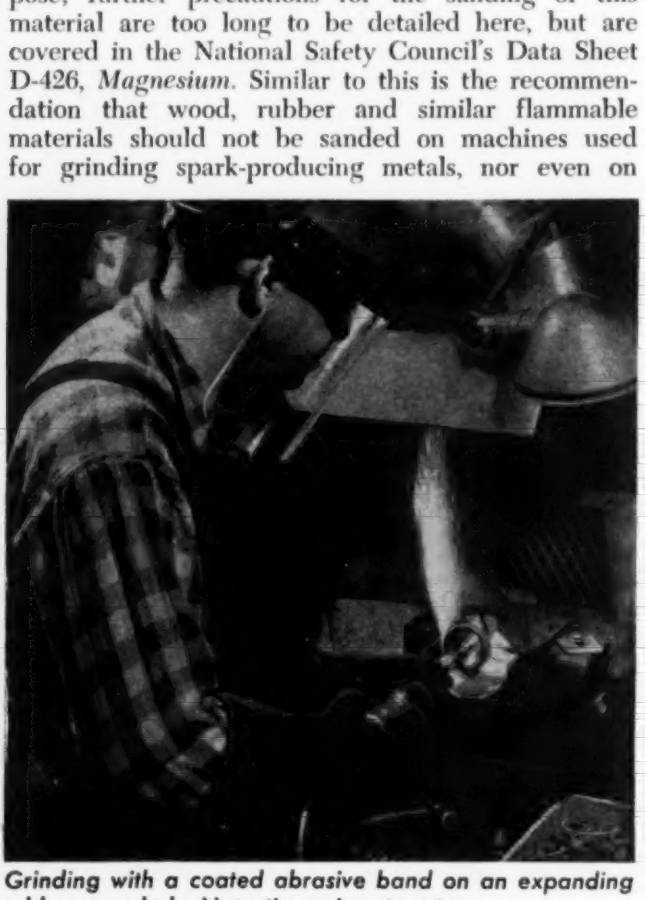
Protective Equipment For The Operator

Protective equipment to be used by the operator depends somewhat on the type of machine he is using, but in all instances should include either safety goggles or a face shield, which are standard in many plants anyway. Because the hazard of flying particles of either the abrasive or the material being sanded is a serious one, this eye protection should be worn even though a barrier is provided on the machine. In some cases a respirator may be needed.

Workmen using portable disk grinders usually should wear, in addition, protective aprons of leather or similar material, together with gauntlet-type gloves and wrist protectors for protection in case the grinder slips and the edge of the disk comes in contact with the inside of the operator's wrist. There is also a possibility that a portable sander may be twisted out of the hands of the operator and cause injury.

However, the protective measures above, plus special care by the operator when he is working on corners, sharp edges or other places where snagging is likely to happen, should be sufficient to prevent serious injury. • • •

(Editor's Note: Portions of the above article are based on Data Sheet D-452, copyrighted by the National Safety Council. Material for the data sheet was developed by the Eastern New York Chapter of the American Society of Safety Engineers, and was reviewed extensively by members of NSC, representatives of chapters of ASSE, and by the Safety and Industrial Health Committee of the Coated Abrasive Manufacturers Institute. Copies of the full data sheet are available from the National Safety Council, 425 North Michigan Avenue, Chicago 11, Illinois.)



Grinding with a coated abrasive band on an expanding rubber mandrel. Note the exhaust system.

Die grinding with a coated abrasive disk.

Questions and Answers

By **Arthur Rakestraw**

RELATION OF WHEEL DIAMETER AND SPECIFICATIONS

• In looking over some recommended gradings for tool room internal grinding, I have noted that for a given material, the recommendations are for somewhat coarser grits and softer wheels as the wheel diameter increases. Why is this?—A. T. Cleveland.

Not only is this true for internal, but also for external grinding operations. Undoubtedly, the arc of wheel contact to the work is the determining factor. As the grinding wheel diameter increases, the amount of peripheral work surface also increases, necessitating a softer grade of wheel to provide equivalent grinding action. Coarse specifications, because of the smaller number of abrasive particles per unit of contact area, will grind cooler. •

USING CUP WHEEL STUBS

• Recently I ran across a practice which puzzled me a little. In this shop, operators were using cup wheels until the cup had been practically flattened out, then dressing off the balance of the wall and using the original back of the cup as a straight wheel. In this way, a cup wheel can be used almost down to the bushing. I would like to have your comments on this.—C. T. Chicago.

The practice of using an abrasive cup wheel down to very near the wheel bushing has its merits. Not many shops have applications where such a procedure would be feasible. We have known, for instance, of some large corporations operating several plants, where one of the plants purchased new wheels of the same specification and diameter that another was discarding.

There are several precautions to be observed in connection with a program such as you have outlined.

The safe operating speed of these wheel stubs depends not only on the diameter, but also on the grade. In order to be assured of safe operation, we suggest that the shop contact the wheel manufacturer for information as to the safe operating speed of the stub size in that particular specification.

Extreme care must also be exercised to insure that any cracked wheel stubs are not remounted. •

LIMITS OF ECONOMICAL STOCK REMOVAL BY GRINDING

• What is generally considered to be the maximum amount of stock that can be economically removed from a casting by grinding?—T. D. Youngstown, Ohio.

If there is any generally accepted standard for stock removal by grinding, it has never come to our attention. From our observations, there is very little evidence that various plants have made any attempt to follow an established rule other than what they may have arrived at within their own plant.

In the majority of cases, we believe that individual plants process their parts with available equipment, unless the particular job warrants additional equipment.

Parts may be processed direct to the grinder, eliminating preliminary rough turning or milling. Although the amount of stock to be removed may appear great, the saving of an operation may offset the additional grinding time and may be deemed more economical.

We recall one plant, producing cast iron gear covers in large numbers, where parts were finish ground, removing as much as ¼" of material. Preliminary milling operations, with costly holding fixtures, were eliminated. Undoubtedly this plant considered the procedure economical.

There are many operations where plants have eliminated rough and finish turning operations and processed parts directly to a cylindrical grinder. It is our belief that unless the production level warrants the purchase of additional or new equipment, that the degree of economy would be determined within the plant, on specific applications, rather than by comparison with production figures resulting from outside applications, and that the total cost of the processing would be the key to the decision, rather than the single item of the amount of stock removed by grinding. •

OXYCHLORIDE WHEELS

• For what purposes and to what extent are oxychloride bonded wheels used?—A. T. Toledo

Abrasive wheels and discs bonded with magnesium oxychloride are used chiefly on spring grinding operations, where the operation is performed dry.

Because wheels for spring grinding represent but a very small percentage, by volume, of the grinding wheel manufacturers' production, the use of magnesium oxychloride as a bonding material is very limited. •

wherever abrasive operations are performed

SHOP HINTS

Light pressure with stone rounds off the edge of the grinding wheel.

Hand Stoning Wheel Edges Prevents Feed Lines

By **H. J. Gerber**

• A small, coarse grit, abrasive stone is useful to round off the edges of fine finishing wheels on the cylindrical grinder. Rounding the edges after the wheel is trued serves the dual purpose of preventing edge chipping and minimizing any tendency to produce feed lines on the work. This preventive measure is particularly important on the leading edge of the wheel if feed is in one direction only.

This same procedure is also effective on the wheels of surface grinders. •

Descaling by the Dip Method

By **Charles G. Tuvek**

• Soaking parts for five to twenty minutes in an inhibited hydrochloric acid solution of one quart to a gallon of water is a very effective way of removing heat treat scale and rust.

Either a stainless steel tank or tub, or a crock, is essential to hold the dipping solution, and the parts should be held in a chrome or other acid-resistant basket.

The work pieces will be somewhat darker in color after the dip, but the scale will either have been completely dissipated, or will be loose enough so that the pieces are acceptable for machining.

If the pieces are nearly finished, or if grinding is the next operation, the parts should be soaked for one minute in an alkaline solution to neutralize the acid, and then run for five to fifteen minutes in a finishing barrel, with an abrasive compound to which sand has been added. Unless the acid is neutralized, hydrogen gas may be generated in the barrel and build up pressure.

For faster results, hot water may be used in the dip solution. Good ventilation or an exhaust system to carry off the fumes is a necessity.

A harsh alkaline solution may also be used for removing scale and rust, and will not change the color of the work pieces. The alkali should be added to cold water and stirred until dissolved, when hot water may be gradually added. If harsh alkalis are added to hot water, violent spattering will result. •

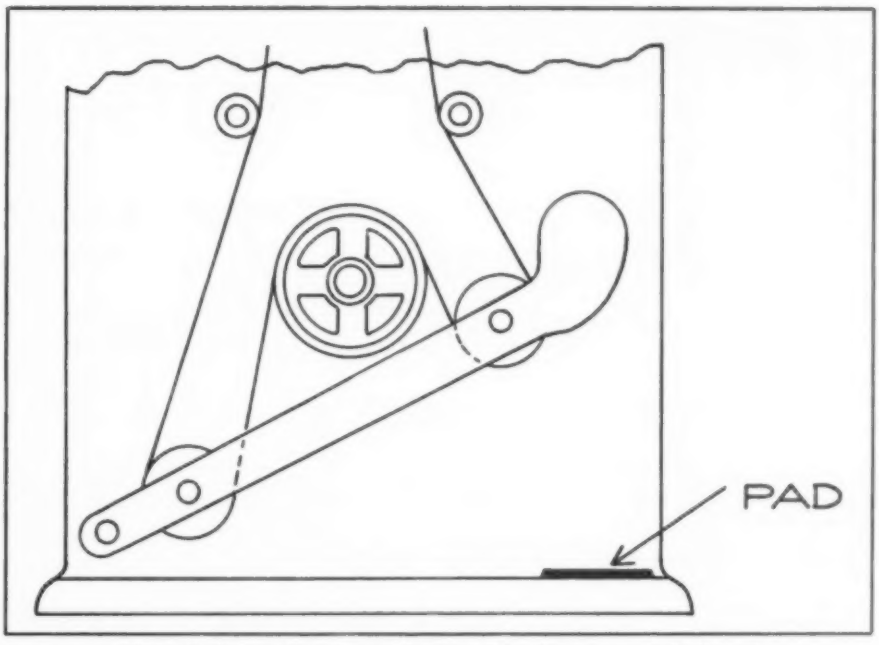
Pad Cushions Weighted Arm

By **Clifford Molloy**

• A number of surface grinders in our shop have the motor in the base and use a belt drive to the spindle. Two idlers on a weighted arm, as illustrated, keep the belt tight and permit elevation of the spindle.

Once in a while a belt breaks and the weighted arm crashes down against the base of the machine with a violent blow. The noise always causes some delays in the shop as operators look around to see what has happened. On one such occasion, when the belt broke while the spindle was at its highest position, the blow cracked a piece off the edge of the base.

To prevent a recurrence of this and to reduce the shock to the operators when the arm falls, we have cemented a piece of ½" thick die rubber pad to the base as shown. It effectively reduces the shock and the noise. •



If the belt breaks, the rubber pad in the lower right-hand corner absorbs the shock, reduces the noise.

Nursery Swabs Make Good Hole Cleaners

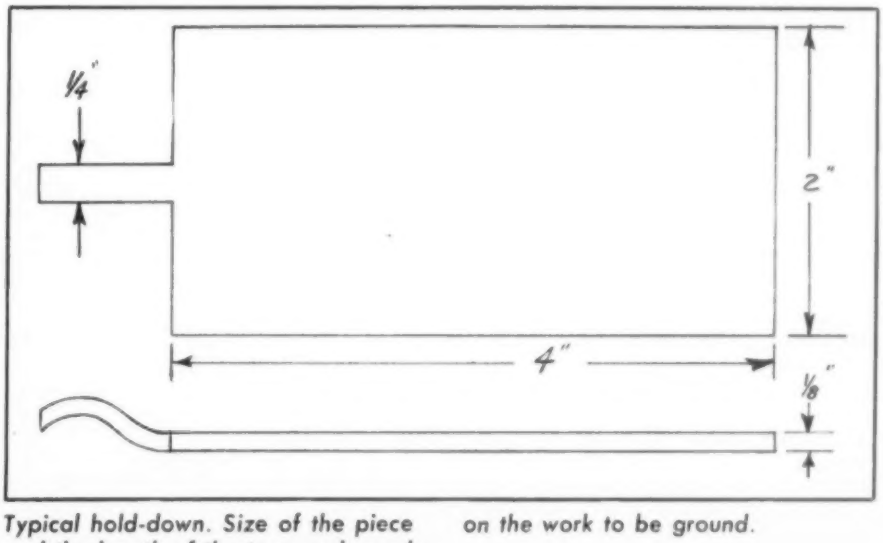
• Delicate machining operations, in which parts must be handled with almost clinical attention to the presence of foreign particles, have brought the cotton-tipped swab from the nursery to the factory. Swabs such as Q-Tips—originally designed for nursery use—are being used to clean center holes prior to mounting for machining, and for cleaning bottoming holes before gaging. Other shops find them useful for applying flux in delicate soldering operations, for various inspection operations, and for applying oil, coatings, colors and code-marks. •

Hold-downs for Non-Magnetic Parts

By **A. H. Somerville**

• Workable hold-downs for non-magnetic parts to be ground on the magnetic chuck can be quickly cut or sawed out of either 1/16" or 1/8" black iron, in sizes and shapes to suit the job, following the illustrated pattern. The variations are innumerable, and the pieces are cheap, quickly made, effective and expendable.

The tongue of the hold-down should be bent so as to put pressure on the part being ground. With the tongue resting on the workpiece and the other end of the hold-down on the chuck, there should be a little clearance between the chuck and the inside end of the hold-down. After the current is turned on, a tap with a soft hammer will pull the hold-down tightly to the chuck, firmly holding the work so that parallelism is assured. •



Typical hold-down. Size of the piece and the length of the tongue depend on the work to be ground.

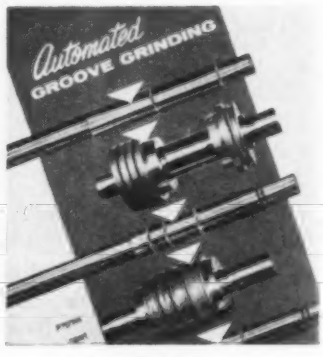
wherever abrasive operations are performed

Free Literature

For further information on any of the products listed here, use the handy postpaid card opposite page 64.

(See Number 1)

(See Number 2)



(See Number 9)

1. Dress Grinding Wheels Quickly and Accurately, With the Direct Reading Tangi-Matic Dresser, is the heading of a recent brochure. Although designed primarily for surface grinders, the dresser is readily adapted to other types of grinders, and is sufficiently rigid to be used also as a grinding fixture. How to zero the diamond, set a curve radius, and set a tangent angle is fully discussed and illustrated. Parts of the instrument are pointed out on an illustration. The 35 lb. dresser is 15" long, 6" wide, 7-9/16" high, having a cross slide travel of 2¾". Threadwell Tap & Die Co., Greenfield, Mass.

2. Controlled Elastic Deformation Grinding, with the Ceda/Size, is described in the October, 1958 "Chips" from Brown & Sharpe. Small cylindrical parts can be ground in production to a positive accuracy of one hundred thousandth of an inch, and approximated to millionths, according to the publication. Articles include tool design, the construction of a cash register, a new gear type pump, with many new products listed. Brown & Sharpe Mfg. Co., Providence 1, R.I.

3. Grinding Wheel Institute Safety Booklet. The Safety Committee of the Institute has recently published a 24-page booklet entitled "Safety Recommendations for Grinding Wheel Operation." This booklet discusses maximum peripheral speeds, strength classification of grinding wheels, definitions of maximum speeds, the effect of wheel speed on grinding action, safety guards, mounted wheels, proper mounting procedures, truing and dressing, and the do's and don'ts for safe grinding. It also contains a handy table for the operator's use in converting revolutions per minute (rpm) to surface feet per minute (sfpm). Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

4. Plain Cylindrical Grinder. Four-page bulletin CD-58 describes the Landis 10" Type DCH—14" Type LDCH plain cylindrical grinder. A typical example of how automation can be applied to this grinder, and work set-ups with an extra wide wheel or spaced wheels are shown. Standard and extra equipment, with specifications, are also included. Landis Tool Co. Waynesboro, Pa.

5. Linear Actuator. The Inchworm motor type 203 is described in folder as accurately and easily controllable in increments of millionths of an inch. It is used as a control for positioning tools and machine elements and as a component in high precision instrument systems. Features, application, installation and specifications are given for the unit. Outline and installation dimensions, and load characteristics, are given in diagram form. Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, N.Y.

6. Finish Grinding of Beryllium shapes is necessary to obtain sharp edges and close tolerances. The value of berrllium having a lightness of magnesium alloys, a stiffness greater than steel, a useful structural range above the melting points of aluminum and magnesium, is discussed in "Fabrication of Beryllium." This paper was presented by K. G. Wikle, Mgr., Metallurgical Process Development Div., Brush Beryllium Co., before the semi-annual meeting of the ASTE in Los Angeles, Sept. 29-Oct. 3. Illustrations and tables are given covering the forms of beryllium and fabrication techniques. (Reprinted through courtesy of the American Society of Tool Engineers.) The Brush Beryllium Co., 4301 Perkins Ave., Cleveland, 3, Ohio.

7. Precision Grinding and Lapping Machines. Revised catalog includes details on the Type S-3 6x18" hydraulic surface grinder, the No. 2 unitized transfer type crankpin grinder, and the Type CC-8 Crank-O-Matic semi-automatic crankpin grinder. The general features of Norton cylindrical, roll, angular, multi-wheel, cam, universal, tool and cutter and special purposes grinding machines and the precision lapping machines are described. Catalog numbers for specific machines are listed. Norton Co., Worcester 6, Mass.

8. Precision Universal Angle Vise, Model 1A, is discussed in Brochure No. AV-158. Specifications are given on the complete Wesson line of angle vises and angle plates. Illustrations are included of production and job-shop applications for the new universal vise line helpful in planning lower cost, compound angle precision setups for milling, drilling, planing, shaping, grinding, boring and sawing, among other operations. Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich.

9. Automated Groove Grinding. Progress Report No. 2 on automated groove grinding, a joint development of Koebel Diamond Tool Co., 9456 Grinnell, Detroit 13, Mich. and Jones & Lamson Machine Co., Springfield, Vt. is now available. The report stresses the value of continuous or intermittent dressing of formed wheels without interruption to production. The CDP (cemented diamond particles) cutters, when used with PFC (perpetual form control) dressers, reportedly provide continuous automatic control of accuracy of grinding wheels and grinding wheel action. Simultaneous grinding and wheel dressing are diagrammed for various grooves.

10. Briquettes For Machining Gray Iron. A 16-page booklet on Ferrocarbo briquettes discusses its affect on microstructure and machinability of gray iron castings. The literature contains detailed information of the product on cupola melting practice, machinability, graphite, sulphur, iron carbide, iron phosphate, structure, and segregation. A detachable 4-color insert shows numerous photomicrographs on segregation. The inside of a cupola is diagrammed on the insert cover. Electro Minerals Div., The Carborundum Co., Niagara Falls, N.Y.

11. **Effect of Lubricants On the Wear In of New Machinery** is covered in Lubrication Newsletter No. 5. A thorough engineering study of the surface geometry of mating surfaces is included, together with a discussion of Coulomb's theory on friction as it applies to the ever-present asperities on machined surfaces. Test equipment used in a series of tests on the lubrication of mating surfaces is described. Actual test records are pictured and analyzed. The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

12. **Barrel Finishing and Wet Blasting Media,** compounds, and abrasives are described in a supplies catalog and price list, Bulletin No. 89. Trade named Techforms and Techangles, the abrasive media are listed in 19 different sizes and shapes, and in four different types of substances. Formulated chemical compounds for barrel finishing, named Chempounds, are given in nine standard formulas for deburring and radiusing, polishing, cutting down, descaling and corrosion removal, and burnishing operations. Techline liquid abrasives for wet blasting, Liquabrasives, are listed in nine different types, along with chemical additives for wet blast abrasives. Techline Div., Wheelabrator Corp., 1169 Avenue V, Vicksburg, Mich.

13. **Contour Dresser for Cylindrical and Surface Grinders** is illustrated and described in flyer available. The unit features inexpensive dressing of complicated forms, with use of two diamonds—one for roughing and one for finishing. Contour checker is used to check squareness and contour of stylist and diamond point. Diagrams show some of the many forms obtained with the dresser, such as form rolls, spindles, and guillotine gage. J & S Tool Co., Inc., Dorsa Ave., Livingston, N.J.

14. **Depth-Type Fiber Cartridge Filters,** for full flow filtration of all types of fluids, are presented in Micro-Klean catalog No. 53-101. Complete information is given on the full advantages of Cuno's exclusive graded density cartridge construction. Selection of the proper filter and filter cartridge for any application is met by the selector chart, cartridge life curve, flow rate table, and other product performance information contained in the catalog. Essential dimension, weight, and installation data, complete with line drawings and pictures, is provided. The Cuno Engineering Corp., Dept. 53, S. Vine St., Meriden, Conn.

(See Number 10)

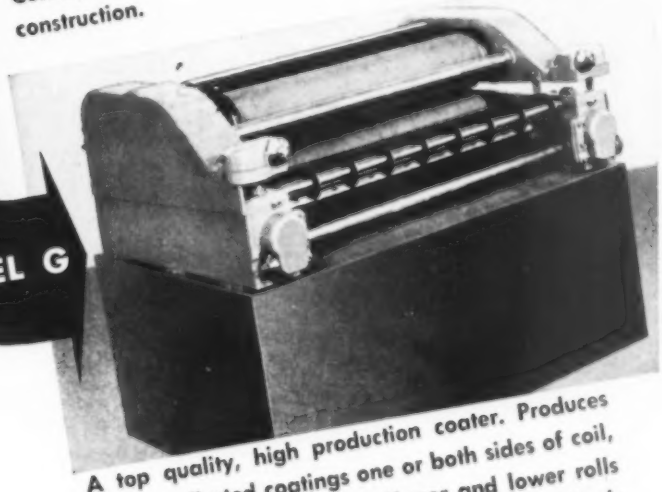
MURRAY-WAY ROLLER COATERS

give you BETTER, FASTER, CHEAPER PRODUCTION COATING with COMPOUNDS, WAXES, SEALERS, RUST-PROOFERS, PAINTS or VARNISHES

MODEL C

Budget priced. Ideal for automated production lines. Gives one or both sides application of adjustable thickness coatings. Conveyors are optional. Simple design. Sturdy welded steel construction.

MODEL G



A top quality, high production coater. Produces vernier adjusted coatings one or both sides of coil, sheet or blanked material. Upper and lower rolls independently driven. Hinged construction affords fast access to rolls without disturbing drive adjustments. Shielded drive and bearings.

Murray-Way Roller Coaters are compact in design, built for toughest production jobs and will save their price many times in faster, low cost, uniform high quality production.

There is a standard Murray-Way Roller Coater model to fill most every requirement. Our engineering specialists will produce custom models for unusual applications.

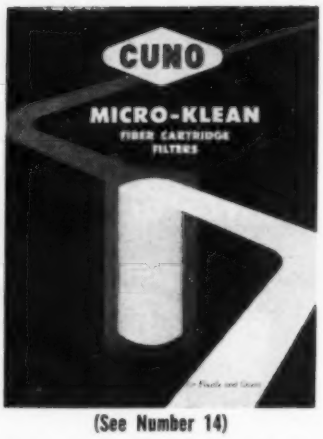
Specialists in automatic metal finishing and materials handling equipment and systems.

MURRAY-WAY CORPORATION

P. O. BOX 180, MAPLE ROAD EAST · BIRMINGHAM, MICH.

FREE LITERATURE *continued*

(See Number 13)



(See Number 14)

15. Belt Sander, Power Tools. A 52-page catalog describes a new 6"x60" hand-stroke belt sander featuring a free-rolling work table, with an optional auxiliary work-table. Belt speeds are 3000 sfm. Full details are included also on a line of band saws, contour saws and band filers, jig saws, saw jointers, saw tables, shapers and shaper cutters, drill presses, tool and knife grinders, jointers, lathes, planers, belt and spindle sanders, spinning tools, motors, controls, supplies and accessories. Boice-Crane Co., 839 W. Central Ave., Toledo 6, Ohio.

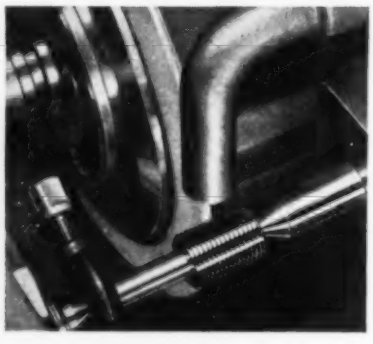
16. Punch Presses. The Model 15 Standard punch press, constructed for dependable high-precision, high-production stamping, forming, and blanking, is discussed in flyer. Specifications: 150 or 180 strokes per minute; rated cap. 15 tons; 1-1½ hp motor required. The Model 15R is a deep-throat rigid rib punch press, with rated cap., 15 tons; 150 or 180 strokes per minute; 1140 rpm motor required. Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif.

17. Vibrators. Bulletin 258 entitled, "Introducing the Lorco Vibrator . . . a new concept of precision finishing," tells about a new method of precision finishing. Lorco Vibrators are said to work from 10 to 100 times as fast as tumbling barrels. The exceptional speed and control reported as possible are due to three-way vibratory action. Both amplitude and frequency of vibration can be varied to fit a wide range of requirements. The bulletin is illustrated by 25 "before and after" photographic reproductions of products finished by this method. Parts fabricated of carbon steel, stainless steel, copper alloys, aluminum, magnesium, zinc die castings, very hard alloys, plastics and wood have all been successfully processed. Large and complex parts or extremely small parts may be handled with equal facility. Lord Chemical Corp., 2068 S. Queen St., York, Pa.

18. Barrel Finishing Compounds and Medias are priced, with discounts on quantity purchases, in the new Almco Supersheen Price List, Form A-23-PL. A series of photographs shows the materials offered Specifications and prices are given both for: 48 different compounds, such as descaling, grinding, burnishing and rust inhibiting types, and medias, such as bonded, oxide, regular, granite, and ceramic chips both crushed and preshaped, steel burnishing balls, and other miscellaneous barrel finishing medias. Almco, Queen Products Division, King-Seeley Corp., Albert Lea, Minn.

(See Number 15)

Automatic Thread Grinding for small workpieces on a REISHAUER



Automatic Grinding Cycle With a Reishauer RAG, thread grinding now becomes *automatic*—saving production steps and time on a wide variety of small parts. Once set-up is accomplished, the operator need only change workpieces.
Automatic grinding wheel re-profiling occurs on the return stroke of the table slide—and can be set to operate after 1, 2, 3, 4 or 6 strokes.
Automatic feed compensation for grinding wheel wear permits grinding to perfect finished dimensions—greatly reducing subsequent measuring time.
Automatic electric truing device has two dressing heads operating independently but simultaneously—with a choice of three different truing speeds.

Typical Workpieces Micrometer Spindles • Thread Gages • Taps With Straight And Helical Flutes (with or without relief) • Small Worms With Fine Pitches • Other Similar Parts.

Operating Principle Longitudinal feed, with single-rib grinding wheels only. Feed movement is by hardened, ground and lapped lead screw in conjunction with precision-ground change gears.

Optional Features Truing Device with one dressing head—for radius-type profiling. Hand-operated truing device. Coolant temperature control system. Attachment to grind anvils for thread flank micrometers, including collet.

Reishauer RAG Automatic Thread Grinder

Maximum Grinding Length..9¾"
Distance Between Centers....20"
Workpiece Diameters.....0.04—¼"
Pitch Range.....6—80 t.p.i.

Write For Additional Information

COSA — *nationwide sales and service of precision machine tools—from bench lathes to boring mills.*
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

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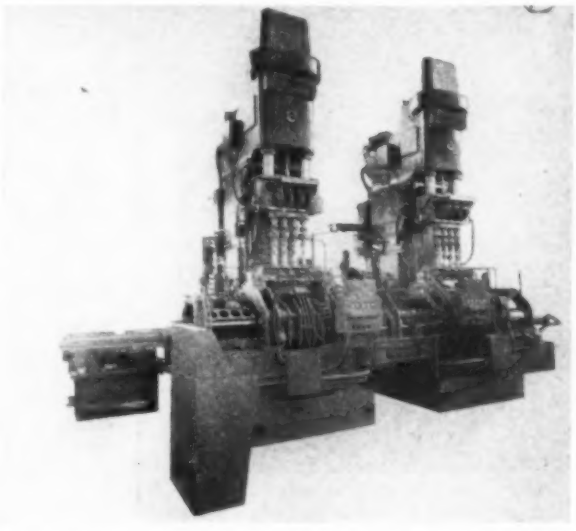
wherever abrasive operations are performed

New Equipment and Materials

Honing Machines Provide Safety in Set-Up

The bores of two different cast iron V-8 cylinder blocks for truck motors are honed on the BarnesdriL Model No. 320 standard vertical type honing machines. Bore sizes are 3.625 I.D. by 5-11/16" long and 3.875 I.D. by 6¼" long in respective parts; both semi-blind end bores. Two machines are placed side by side and connected by an automatic trunnion and transfer type fixture. The complete machine is fully automatic and equipped with electrical interlocks and probe for maximum safety in set-up and operation.



While the machine is in operation, the operator is required only to replace worn out honing stones as directed by signal lights on the control panel which indicate when each tool requires new honing stones, and also to move the parts manually on the conveyor approximately one part length into the pre-loading station. A sensing device in the pre-loading station detects the presence of a part and starts the automatic work cycle of transfer, load, clamp, trunnion, hone, return trunnion and unclamp.

The auxiliary heads are arranged with pneumatic hone expansion which features automatic rapid expansion and collapse and automatic compensation for stone wear.

Bore sizes, after honing, are reported as consistently within .0005" from bore to bore of the specified diameters and geometrically accurate within .0005" for taper and .0005" for out-of-round. Surface finish is maintained at 35 rms.

Barnes Drill Co., Rockford, Ill.

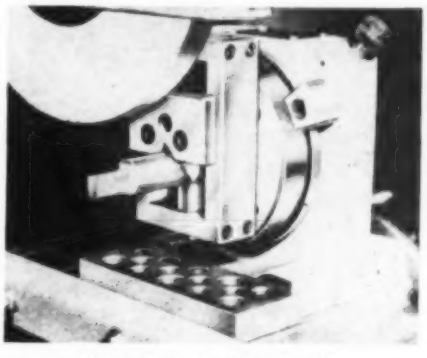
Use postpaid card. Circle No. 101

Ball-Seat Punch Adapter For Grind-All Fixture

The ball-seat punch adapter locates and clamps ball-seat type punches in the Harig Grind-All Fixture. The nib of this adapter accurately locates the ball-seat type punch in the same relationship as it will be in the punch holder.

The hardened and ground adapter attachment is available in 1/4", 5/16", 3/8", and 1/2" nibs to fit these respective ball-seat sizes.

Harig Manufacturing Corp., 5757 W. Howard St., Chicago 31, Ill.



Use postpaid card. Circle No. 102

Alum. Oxide Bonded Wheels Used With High Speed Steel

A line of V-8 bonded grinding wheels for high precision tool room and surface grinding operations is now being offered.

V-8 bonding is an exclusive Dayton safety grinding wheel process which reportedly produces uniformly balanced wheels, permitting precision grinding to closer tolerances with smoother finishes and no chatter marks.

The wheels, composed of a highly refined variety of aluminum oxide, are designed for use with high speed steel and special alloy steels, such as high carbon-high chrome.

Cup, saucer, and straight wheel shapes are available with diameters from 3" to 12".

Sales Promotion Dept., Simonds Worden White Co., 1101 Negley Place, Dayton 7, Ohio.

Use postpaid card. Circle No. 103

Lightweight Portable Transistorized Gage

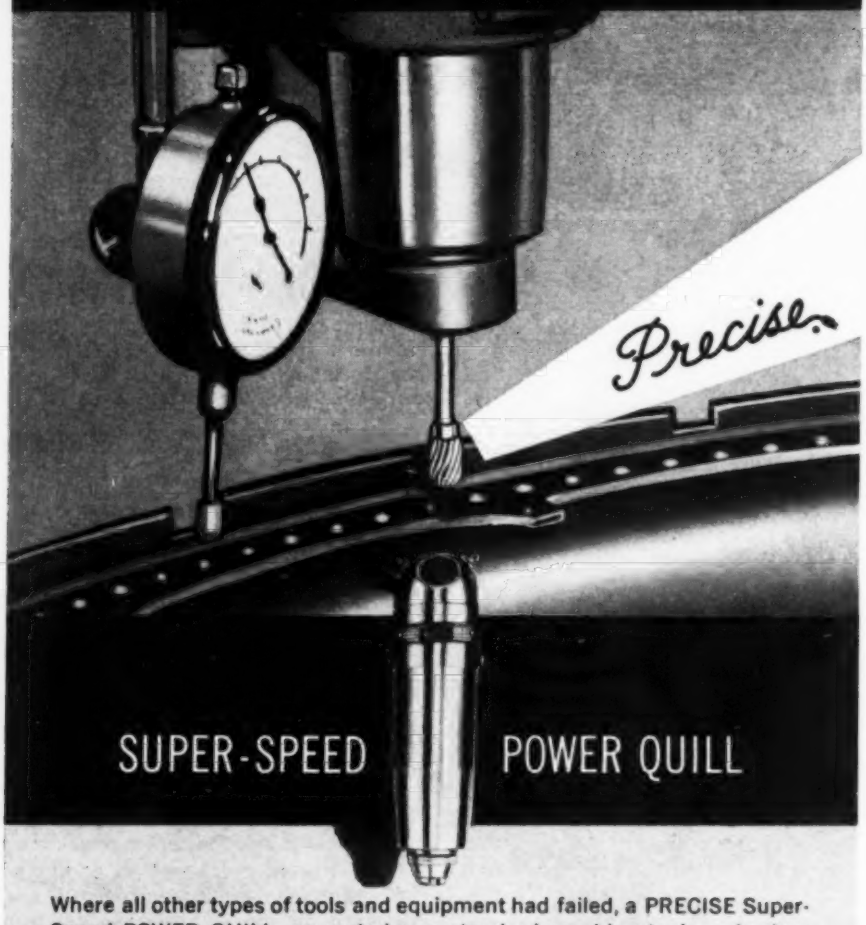
The small sized Indi-Ac Jr. transistorized electronic gage is adaptable to either battery or AC power source. Its extreme light weight (68 oz.) and compactness (5⅜"x7"x3¼") make it valuable for big or small shops. Whenever it is used on 115 volts AC, its rechargeable battery is storing energy, even during use, for future battery operation.

Color coded scales (3 of them) are said to give extreme accuracy and range from less than .000,020 inch to .020 inch. Since zero points and readings are transferable from one scale to another, no re-zeroing is necessary in changing scales.

The lightweight, compact T-210 gage head is protected from oil, grit, and

For further information on any of the products listed here, use the handy postpaid card opposite page 64.

MICRO MILLING STAINLESS TO .001"
WITHOUT SHEET DISTORTION



SUPER-SPEED POWER QUILL

Where all other types of tools and equipment had failed, a PRECISE Super-Speed POWER QUILL—mounted on a standard machine tool—solved an acute milling problem for the Delta Corporation, Hartford, Connecticut. The high speed and precision of a PRECISE Super 60 POWER QUILL easily maintained slot tolerances of .001" on a thin stainless steel jet component without sheet distortion.

PRECISE Super-Speed POWER QUILLS meet every production and toolroom requirement and are quickly mounted with PRECISE mounts on standard and special machine tools. They mill or grind the hardest alloy steel, soft plastic, wood and rubber, aluminum, Masonite and even glass. Their superhigh speeds, high torque, spindle and chuck rigidity permit the use of the hardest cutting tools for faster stock removal, improved surface finishes, maximum tool life, and the maintenance of tolerances to .0001". Adjustable spindle speeds range from 15000 rpm to 45000 rpm with power ratings up to 1½ hp from ordinary 110v or 220v power supplies.

Mail coupon below for complete information on the entire line of PRECISE Super-Speed MICRO TOOLS.

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Branch Plant: Precise, G. m. b. H., Duesseldorf, Germany
Quality and Precision Since 1882

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Power Quills Grinder Millers Milling Machines Accessories
Rotary Cutting Tools Vapor-Lub Cooling Systems

PRECISE PRODUCTS CORPORATION, 3735 Blue River Road, Racine, Wisconsin
☐ Send complete information on Power Tools ☐ Have salesman call.
Also send data on ☐ Cutting Tools ☐ Vapor-Lub Cooling.

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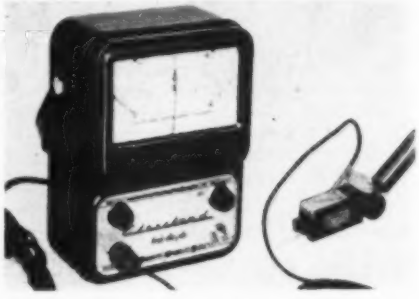
magnetic fields, and in addition is protected from damage through care-



less handling or accidents by the exclusive Protector Tip. Gage head mounts on any suitable height gage or comparator stand, fixture or machine. Several gage heads may be switched into one amplifier on fixtures using multiple gaging circuits.

Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 104

Impact Grinder Has Magnetostrictive Transducer For 100% Duty Cycle

Model 2-335, priced under $1,000, uses a magnetostrictive transducer which is said to permit a 100% duty cycle. The ultrasonic impact grinder is used for cutting, slicing, drilling, grinding, and trepanning regular or irregular shapes quickly, accurately, and economically. It is designed for use on semiconductors, ceramics, ferrites, carbides, metals, jewels, and other hard or brittle materials.

The cutting head is mounted on a rugged base and has a reportedly foolproof cutting force adjustment and a built-in force dial. The ultrasonic driver produces 100 watts.

The manufacturer offers a full year guarantee on the transducer, with an additional 18 months warranted on a pro-rated time basis.

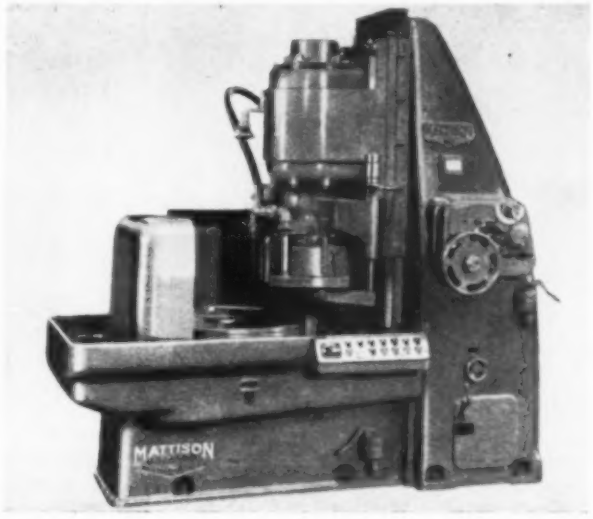
Raytheon Manufacturing Co., Waltham 54, Mass.

Use postpaid card. Circle No. 105

Quick-Tilting Creates Wheel Clearance On Rotary Surface Grinders

A quick-tilting device on vertical-spindle rotary surface grinders makes it possible to convert from rough to finish grinding in seconds, so advantages of both high stock removal and flat grinding can be realized.

One of the problems in grinding for stock removal has been the time-consuming adjustments necessary to tilt the spindle in order to eliminate wheel drag. This is critical when the contact area between the wheel and work is uninterrupted and large.



First, the elliptical form presented to the work by the leading edge produces a curvature in the surface. Also, it is necessary to center the work under the low point on the ellipse in order to minimize this curvature, and this often requires readjustment of the spindle in relation to work arrangement on every job.

Mattison's new quick-tilt spindle simplifies the problem because now every chuck load can be rough ground first using an arbitrary .010" wheel tilt. Location of the low point makes no difference as long as there is stock available for finishing. In seconds, the spindle can be returned to the vertical position and a light finishing cut taken to produce perfectly flat parts. There is no need to compromise accuracy to improve stock removal efficiency.

A selector switch on the column actuates an air cylinder that automatically tilts the wheelhead and spindle toward the work, or back to "dead flat." Then, after reducing the rate of downfeed slightly to keep power draw at the optimum, the machine is ready for the finishing cut and sparkout.

The standard Mattison No. 24 vertical rotary is now offered with up to 60-hp spindle motors and preselected stock removal up to .240". Continuous downfeed has a low feed range of from .005" to .042" per minute and high range of from .020" to .165". Precision is easily held with continuous downfeed and automatic cycling because the last full increment of a ratchet-type feed can be cut in half. Gauging off the piecepart, air or electric automatic sizers actuate the cycle for grinding on a production basis to close tolerances without stopping to check accuracy.

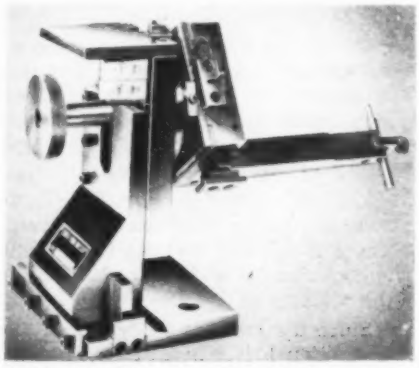
The new spindle is available as optional equipment on all Mattison No. 24 and 36 vertical rotary surface grinders.

Mattison Machine Works, Rockford, Ill.

Use postpaid card. Circle No. 107

Accurate Wheel Dressing Of Combined Radii and Angles

With the Zenith form dresser it is now reported as possible to grind any amount of radii and tangent in one set-up without moving the dresser. The tool is hardened and triple-ground on all surfaces, and pre-loaded with balls to take up all wear. Gage blocks are the controlling factor, and all movements of the diamond are dead accurate, the manufacturer states.



Model 1-B with square dimensional movement.

This dresser can be used on the side of grinding wheels by removing column slide, indicating plate, and control knob. By removing the gooseneck, it can be used as a whirl-a-jig.

A mahogany box contains the dresser, complete with diamond, set-up block, and sine bar.

R & A Tool and Engineering Co., 7338 Woodward Ave., Detroit 2, Mich.

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"ONE SOURCE"...

H. S. STEEL—TANTUNG—CARBIDE—ABRASIVES—DIAMOND

FOR HIGH RPM ROTARY CUTTING TOOLS

To meet your production or toolroom grinding, milling, or finishing operations, look to PRECISE as one source for all your HIGH RPM rotary cutting tool requirements. PRECISE Rotary Cutting Tools are available in H. S. Steel, Tantung, Carbide, Abrasives, and Diamond, in a complete range of sizes and shapes. They represent the highest in quality and performance for faster, more efficient metal removal and improved finishes.

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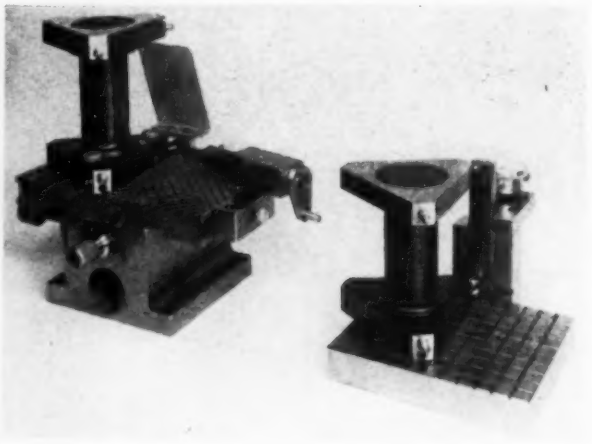
Contour Dresser For Cylindrical/Surface Grinders

Forms may be dressed and readily held to template contour by use of the J & S contour dresser.

Stylist contour checker is used to check squareness and contour of stylist and diamond point, and is also used for setting the driving arm to correct position.

The form on the diamond point is quickly duplicated on the stylist by inverting the dresser and correcting the stylist against the grinding wheel. Micrometer feed control on the base feeds diamond into the grinding wheel for dressing. Rigid feed control enables the operator to traverse the stylist over the template contour with controlled ease and accuracy.



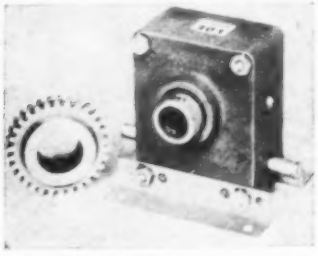
The dresser is easily set-up, and offers repetitive dressing without removing the work piece on the surface grinder. Two diamonds are used—one for roughing, and one for finishing.

J & S Tool Co., Inc., Dorsa Ave., Livingston, N.J.

Use postpaid card. Circle No. 109

Speed Reducers With Increased Torque Capacity

SW-1 speed reducers now are available with aluminum driven worm gears



of bearing type alloy, which are said to provide up to three times greater torque capacity than the widely-used molded nylon type. Both gear types now are available in all model SW-1 reducers. The reducers have ratios of 3½ to 60:1, solid or hollow output shaft. The complete fhp unit, with molded nylon fiberglas case and machined steel worm gear input shaft, weighs less than 21 ounces.

Typical applications include business machines, appliances, control devices, servo mechanisms, and other power transmission systems.

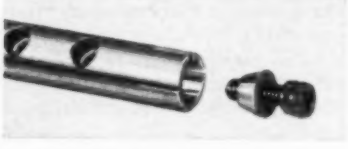
Rampe Manufacturing Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Use postpaid card. Circle No. 110

WHY *Robbins* IS YOUR BEST BUY

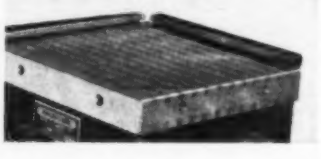
Only Robbins angular tooling equipment assures you positive accuracy when setting up to machine, grind or inspect angular work . . . because only Robbins gives you these exclusive features:

POSITIVE LOCKING locks firmly inside sine bar roll with expanding action for positive lock. Screw at each end locks toward front of unit, always pulls upper member firmly down on gage block without distortion. (Pat. app. for)



"PERMA-FLAT" SWIVEL BLOCK contacts gage block over entire face of swivel block instead of on a single thin line of contact. This patented feature provides greater contact between gage block and unit . . . combines with Robbins positive locking to assure the utmost accuracy.

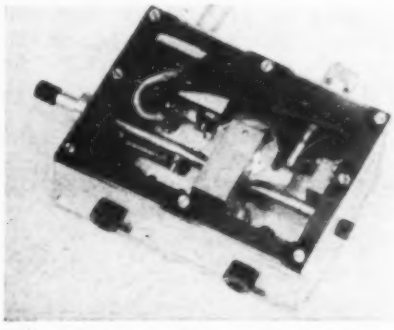
FINE POLE ceramic magnet chuck, manufactured for Robbins by famed O.S. Walker Company, Inc. Strongest magnetic chuck available. Fine poles make it easier to set up smaller work, go right to the edge for easier setup next to rails.



IN ADDITION, both magnetic and non-magnetic models are built with ribbed base, intermediate and top plates for distortion-free strength and rigidity, with full-length ground roll seats for precision location, greater accuracy. All models make it possible to set up any angular work in just four simple steps . . . in minutes instead of hours! Before you purchase any sine plate, be sure you check Robbins' exclusive features. Write for new catalog!

OMER E. *Robbins* COMPANY
11961 DIXIE AVENUE DEPT. G DETROIT 39, MICH.

No Computing of Eccentricity With This Electric Indicator



The Model A-93 Eccentricator is said to indicate eccentricity, runout, lack of squareness, or wobble, even during high speed operations. It is a spindle actuated, precision switching mechanism, equipped with signal lights.

The indicator is reported as automatically indicating variations directly. There is no need for logging minimum and maximum readings and computing the difference.

Since the indicator provides an electrical signal, it is useful for automatic as well as manual inspection.

Federal Products Corp., 1144 Eddy St., Providence 1, R.I.

Use postpaid card. Circle No. 111

Optical Flats In Fused Quartz/Pyrex Glass

A full line of Lapmaster optical flats is now available in either clear fused quartz or Pyrex glass. The flats are supplied in two certified accuracies, 1/10 or 1/5 light band, to cover a

wide range of flatness reading requirements. Both types are double surfaced to avoid reading error which commonly results from using the wrong side of a single surface flat.

The optical flats are furnished in standard sizes from 1" through 12" diameter, and are individually packaged in sturdy leatherette-covered box.

Crane Packing Co., Dept. GFN, 6400 Oakton St., Morton Grove, Ill. or Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont., Can.

Use postpaid card. Circle No. 112

12"x24" Magnetic Chuck Has Great Work Capacity

As in other Walker permanent chucks, the new 1224 chuck incorporates ceramic magnets which have many times the coercive force of alloy magnets. Work-holding ability is reported as excellent, even on very thin parts. Secondary external fields are controlled to prevent magnetism from invading the machine table and ways.

The 12" x 24" chuck, like all other chucks in this line, is entirely suitable for milling and planing. During milling and planing operations, the cutting tool is automatically subjected to a demagnetizing influence during the cutting cycle, because the magnets are polarized horizontally rather than vertically. This allows free cutting without chip interference, and thus eliminates the danger of scored surfaces and broken cutters resulting from chip adherence.

O. S. Walker Co., Inc., Worcester, Mass.

Use postpaid card. Circle No. 113

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BOND... the big reason why diamond wheels by J. K. Smit meet your requirements

EXPERIENCE... gained from many years of testing cementing mediums and fillers

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"PRESSURE-SET"
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DIAMOND DRESSER
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Specific Needs

Whether you use single or multi-stone settings . . . in unipoint, spade-type or profile dressers . . . you'll find PRESTALLOY offers you a complete, immediate selection of clean-cutting, long wearing tools. And only PRESTALLOY gives you the established advantages of "Pressure-Set" mounting . . . an exclusive diamond-anchoring method that insures maximum dressing speed and efficiency! In addition to the regular PRESTALLOY line (a few of which are shown below), our flexible production facilities enable us to quickly produce for you non-standard and special wheel dressing tools to meet your exact specifications. Let us quote on your requirements.

Write for your copy of the new PRESTALLOY catalog and price list.

DIAMOND PRODUCTS, INC.
333 Prospect St • Elyria, Ohio
Dealerships available in some areas

NEW EQUIPMENT *continued*

Abrasive Belt Machine Provides High Spd. Method Of Precision Sizing Rotors

An automatic high-speed precision rotor grinder reportedly grinds rotors to diameter tolerances of ±.001" and concentricity tolerances within .0005".

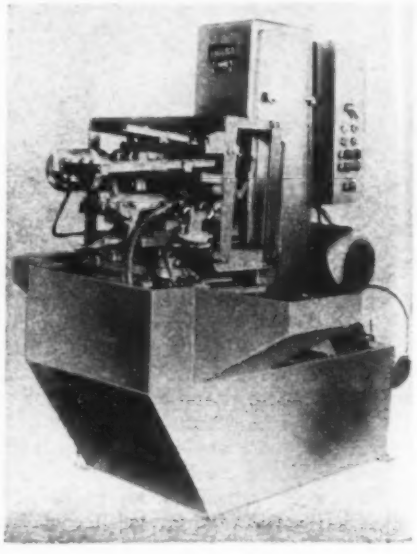
Model BG8/HT handles rotors from 1 to 4½" in diameter. Representative production figures are 3⅜" o.d. rotors, with 2" stack, at rate of 180 per hour, and 1-9/32" o.d. rotors, 7/8" stack, at rate of 1440 per hour.

The machines's rotor fixture consists of a regulating wheel and double or triple, upper feed and lower discharge tracks. It is mounted on a heavy-duty electro-hydraulic feed table. As the machine table infeeds, it is automatically oscillated (6" maximum stroke, with variable frequency of oscillation) to utilize the full width of the 9" x 107" abrasive belt.

Rotors, loaded on parallel sets of inclined feed tracks, are gravity fed into machining position, belt-ground to pre-set tolerances, ejected down lower set of tracks, in a continuous, completely automatic, high-speed sequence.

The rotor-grinder is designed primarily for high-speed operation, heavy stock removal and precision tolerance control. Extreme concentricity tolerance is possible because registration is from rotor shafts or mandrels rather than on centers. The free-cutting and flushing of the abrasive belt eliminates the problem of carry-over from bar to bar on the rotors which would reduce their efficiency in operation.

The regulating wheel, with ¼ hp drive unit, has a variable speed range of from 42 to 125 rpm to accommodate different size rotors. The number of rotors which can be fed side by side down the tracks depends on their width. The table infeed (maximum of one inch), table oscillation, regulating wheel feed, and belt tensioning are all actuated by a ¼ hp 200 psi hydraulic pump unit. Coolant pump



is ¼ hp and coolant tank capacity is 85 gallons. Abrasive belt drive is 7½ hp with 10 hp optional.

Engelberg, Inc., 831 West Fayette St., Syracuse 4, N.Y.

Use postpaid card. Circle No. 114

Gage Checks Bearing Race Preload and End Play

The Air-O-Limit gage is a responding, highly accurate gage for checking the preload and end play of ball bearings.

Checking both statically and dynamically, the gage determines relative face flushness—commonly called stick in and stick out—of miniature and instrument size ball bearing races, such as those used in aircraft instruments and controls for guided missiles.

The Air-O-Limit principle of measuring back pressure created by restriction of air flow is used to check the position of the inner race relative to the outer race under varying axial loads (preload), and the actual axial displacement of the inner race under load reversal of a given magnitude (end play).

Bearings from .040" bore through 1" OD can be checked to a direct reading of 20 millionths of an inch on the preload scale, and five ten-thousandths of an inch on the end play scale.

End play is checked by means of a self-zeroing attachment containing a .015" range Air-O-Limit cartridge and appropriate dead weight loading units in combination with interchangable inner tooling. This attachment is mounted above the upper gaging spindle.

Pratt & Whitney Co., Inc., West Hartford 1, Conn.

Use postpaid card. Circle No. 115

Work Drivers Eliminate Dogging

The Seneca Falls work drivers reportedly eliminate dogging and save six seconds per piece on an 18 second machine cycle. They are said to be self-centering, quick, and positive. Serrated jaws tighten automatically on the work—the harder the pull, the tighter the grip.

Crank shafts for Carrier Corporation's hermetic compressors are ground

—motor end and main bearing—on two cylindrical grinders. Use of the work drivers on both grinders has reduced direct labor costs by enabling one operator to handle grinding operations on two machines.

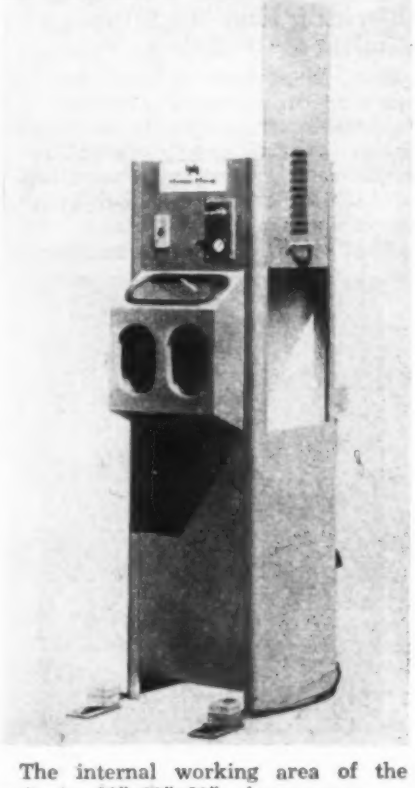
The unit may be used on any type of engine lathe, multiple tool lathe, and on plain or universal grinders for work diameters from ¼" to 6⅞".

Seneca Falls Machine Co., Seneca Falls, N.Y.

Use postpaid card. Circle No. 116

Liquid-Blasting Machine Gives Micro Finish 16-250

The Model 15 liquid-blasting machine, for high production and precision cleaning, finishing, peening, burnishing, and deburring of metal parts, is reported as capable of maintaining micro finishes ranging from 16 to 250 by adjusting air pressures and the size and type of abrasive medias used. The machine can be adapted to existing air supplies. Depending on the application, air required to operate the new unit ranges from 20 cfm to 65 cfm at 90 psi.



The internal working area of the unit is 20"x20"x20"; however, a counter-balanced, side-entry door enables the processing of larger parts.

A centrifugal-design pump provides full agitation of abrasives and a constant and positive feed to the blasting gun. It is capable of producing an output of 35 gpm.

One electrical foot switch controls the air pressure which can be regulated from zero to 160 psi. The other switch controls the window-washing mechanism insuring good visibility during the cleaning operation. An internal lighting system illuminates the entire working area.

For high-production finishing of small parts, such as bolts and fasteners and electronic parts, the machine can be equipped with a Hydro-Hone tumbling barrel for automatic finishing.

Hydro-Hone Corp., 7516 Pacific Blvd., Huntington Park, Calif.

Use postpaid card. Circle No. 117

Discs and Locking Holders Operate at 90,000 RPM

High-speed Contur flexible abrasive discs and locking holders operate at speeds to 90,000 rpm, according to size.

The aluminum Contur disc holders are reported to wear indefinitely. The flexible discs are removed easily. A three point bayonet locking method and a spring loaded centering pin on holders engage the disc for perfect alignment and balance, and remain concentric with grinder mandrel at all speeds.

The discs are available in popular grits of 24 to 320 and in six diameters, ¾", 1", 1½", 2", 3", and 4". The holders are made in three sizes, with shank diameters of ⅛", ¼", and ⅜".

Foster Supplies Co., 6122 Milwaukee Ave., Chicago 46, Ill.

Use postpaid card. Circle No. 118

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Brightboy
RUBBER CUSHIONED ABRASIVES

Heavy-Duty Belt Sander Features Dustless Sanding

The 3" heavy-duty belt sander, featuring dustless sanding, attaches to any standard industrial or domestic vacuum cleaner. It is said to eliminate over 90% of the paint-dust and fine metal powder and provide longer belt life, with cleaner, more healthful working conditions. Sanding is accomplished in the same area where painting is being done.

A reportedly foolproof timing-belt-drive provides smooth, quiet operation and requires no lubrication. Good balance lessens operator fatigue.

The sander is driven by a special B&D motor to deliver a sanding power of 1600 sfpm.

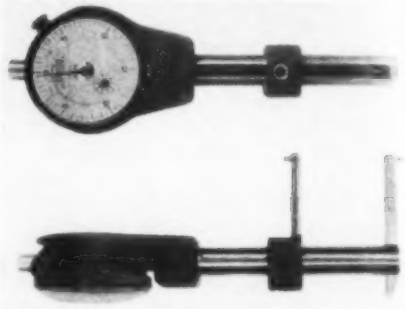
The Black & Decker Mfg. Co., Towson 4, Md.

Use postpaid card. Circle No. 119

Dial Gage Checks Internal Groove Diameters

A portable, compact, easy-to-adjust unit, the Boice groove gage can be used for on-the-job checking or mounted rigidly to a bench stand. Both skilled and unskilled personnel can use the gage with equal efficiency. The dial gage is used for checking internal groove diameters for dimensional accuracy.

The unit is furnished complete with dial indicator graduated in .0005" readings and has an indicator travel of .250". The range is adjustable from a minimum diameter of .750" to a maximum of 3.000", with a ⅛" maximum groove depth and 3/32" minimum groove width. The gage has a 1½" maximum throat depth.



Several design variations may be adapted to this unit for solving unusual or intricate internal groove gaging problems.

Boice Gages, Inc., Hyde Park, N.Y.

Use postpaid card. Circle No. 120

Vibrator Has No-Slipping Timing-Belt Drive

Employing the principle of controlled vibration for precision finishing, the Lorco Vibrator is reported to descale, deburr, do fine finishing, burnish or impart color and luster in from 1/100th to 1/10th the time required by the conventional tumbling barrel.

The range of application extends

Toothed belt is 3" wide. Pulleys are of 7.639" pitch diameter and have a center-to-center distance of 18".

AMERICAN LIP CORPORATION

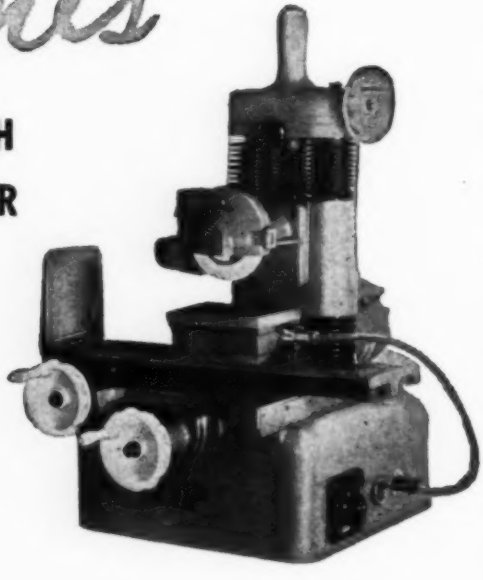
Presents

PRECISION BENCH SURFACE GRINDER

★ EFFICIENT

★ ACCURATE

★ VERSATILE



This compactly designed surface grinder is especially adapted for the precision dry grinding of small parts: dies, tools, gauges and instrument components. The low-cost LIP surface grinder permits the spot use of a number of machines strategically located throughout the plant. Features: Automatic spindle play take-up; precision ball bearings, counter balanced grinding wheel, bellows for dust protection, built in demagnetizer; magnetic chuck surface, 4½"x6"; longitudinal stroke of table, 8"; cross stroke, 4¼". Grinder is supplied complete with a 1/3 H. P. 220 volt or 110 volt ball bearing motor.

Representatives note: Several Exclusive Territories Available.

FOR LITERATURE AND PRICES WRITE TO:

AMERICAN LIP CORPORATION

Tel.: Circle 6-0088

610 Fifth Ave. New York 20, N. Y.

over all metals and alloys, to plastics, and from extremely coarse to very fine work. Either amplitude or frequency of vibration or both can be varied to suit the particular application. The vibrator is made in 20 hp and 30 hp ratings (cap. 12.70 and 17.50 cu. ft.).

A timing-belt drive has no slippage, even under a heavy starting load, and the belt maintains its speed accurately at all times, the manufacturer reports.

The toothed belt engages grooved, gearlike pulleys. The teeth on the belt are molded from neoprene. Because there is no metal-to-metal contact, no lubrication is required. The belts and pulleys are supplied by T. B. Wood's Sons Co., Chambersburg, Pa.

Lord Chemical Corp., York, Pa.

Use postpaid card. Circle No. 121

Battery-Powered Transistorized Indicator

The portable 3 lb. Type 170 Microtrol transistorized indicator is rugged and portable. The battery-powered unit is housed in a gasketed, die-cast metal case for maximum utility under severe environmental conditions.

The indicator provides full-scale ranges of 0.0006 (magnification 7700X) and 0.006 (magnification 770X) inch. Single magnification adjustment calibrates both ranges simultaneously. Simultaneous zero-setting for both ranges is provided by the advanced circuit techniques employed. The transistor amplifier circuit is said to offer complete freedom from drift. The wide-range electrical zero control (0.003) provides minimum set-up time by eliminating the need for precise mechanical positioning of the gage head. On the high-magnification range (7700X) the ten-millionths graduations on a scale length of 4.6" provide readability to better than five-millionths of an inch.

The indicator is furnished with a sensitive low-force gage head which, together with a complete assortment of mounting adapters, is securely retained in the cover of the indicator when not in use.

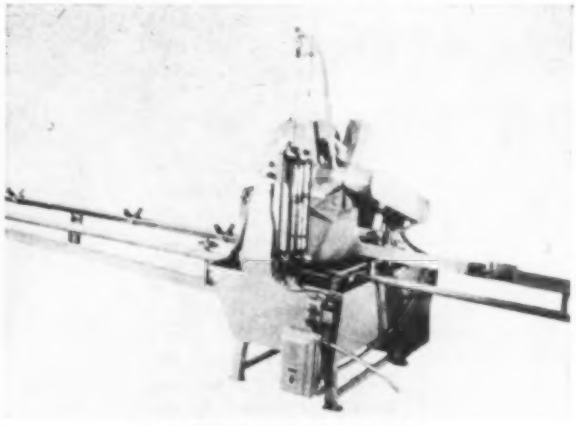
The instrument is suitable for surface plate or height gage work, checking set-ups, runout, or alignments of parts and machines.

Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, N.Y.

Use postpaid card. Circle No. 122

Cutting Unit With Pushbutton Operation

The modular wet cutting unit is reported to have its rate of saw travel infinitely variable to suit the wide materials it is capable of cutting. Clamping movement of the cutting head through the work, and coolant flow automatically follows pushing a button.



A work aligning roller unit, gage unit adjustable to 10'0", and work material stand, are accessories available.

16", 18", and 20" wheel units are now ready.

Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.

Use postpaid card. Circle No. 123

Ernest Olds tells how Moore Jig Borer and Jig Grinder Help "Broaden Our Scope of Precision"

This is another in a series featuring the views of leading tool and die companies

by **ERNEST E. OLDS,** General Sales Manager
Size Control Company, Chicago, Illinois
Manufacturers of gages and lapping machines

MOORE JIG GRINDER (left) and Moore Jig Borer team up in this dust-free temperature controlled room at Size Control Company. Under such conditions they have held hole location tolerances to .00005".

"We at Size Control Company find it absolutely necessary to broaden our scope of precision to meet the increasing needs of our customers. This calls for holding close limits on location as well as our usual tolerances on diameters.

"The Moore Jig Borer and Jig Grinder is our answer! In use, these machines give amazing, practical flexibility to establish extreme accuracy with repeated confidence.

"The Moore Jig Borers and Jig Grinders which we are now using are in a special temperature controlled room. They have held tolerances as close as .00005" with comparative ease. They are used in conjunction with electronic gages, which re-inspect the results of the Borer and Grinder and act as a double-check for accuracy."

In addition to maintaining close tolerances for tooling accuracy, Moore Jig Borers are designed for economical, high-precision production operations. Moore Jig Grinders prove their mettle in the finish-grinding of intricate contour shapes and holes. For literature describing the unique features of both these toolroom time- and cost-cutters, just write...

MOORE SPECIAL TOOL COMPANY, INC.
725 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U. S. A., $6 elsewhere.

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P K

PEKAY ABRASIVES, INC.
271 GROVE AVE.
VERONA, N.J.

Disc Grinder Grinds Workpieces to 18" Dia.

A new and larger model of the Gardner 2H series of precision double horizontal spindle disc grinders has been added to the line of flat surface grinding machines manufactured by the Gardner Machine Company.

The photograph illustrates a new Gardner 2H40L-42" precision disc grinder with rotary carrier fixturing for grinding two parallel sides of valve plates 5.395" in diameter by .170" thick. This version of the 2H40L grinder is equipped with horizontal trough loader for feeding parts into the stations of the rotary carrier, automatic face cut mechanism for progressive stock removal, automatic diamond dresser which is automatically actuated after a preselected number of parts have been ground, automatic size control and integral wet grinding system.

The new grinder is available with 36" or 42" diameter abrasive discs, and with a variety of work carrying fixtures – for grinding metallic or non-metallic workpieces up to 18" in diameter.

Gardner Machine Co., Dept. 31, Beloit, Wis.

Use postpaid card. Circle No. 124

Direct Reading Micrometer, the Speedmike, is a basic simplification in micrometer use. It is read from a counter type dial, alleviating the need to calculate readings. The instrument is reported to significantly reduce the frequency of errors, which in time reduces waste and consequent loss in production. J. T. Slocomb Co., South Glastonbury, Conn.

Use postpaid card. Circle No. 125

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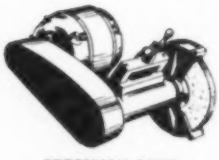
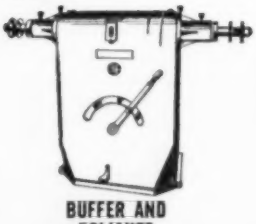
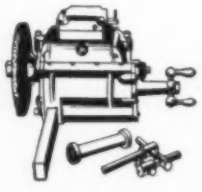


PRECISION LATH



BUFFER AND POLISHER



TOOL POST

GRINDER AND BUFFER

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

wherever abrasive operations are performed

Abrasive Society News

Executives Wanted

Several high-prestige non-paying opportunities are open for American Society for Abrasives who want to sharpen their executive abilities and make their experience and knowledge available to the industry at large. Congenial atmosphere and co-workers guaranteed.

The ASA is forming special committees in various fields of interest to the abrasive and related industries. Here is a list of some of the committees which are being planned.

Abrasive Standards Committee
Awards Committee
Education Committee
Safety Committee
Technical Article Review and Publications Committee
Membership Committee
Industry and Government Relations Committee
Publications Committee
Job Classification Committee

Suggestions as to activities as well as individual nominations will be gladly received. Committee activities offer you a chance to help the Society grow in importance in the abrasive field. Write immediately to Jan Deelman, American Society for Abrasives, 222 Berks County Trust Bldg., Reading, Pa. to advise which committee you want to serve on.

Flint Chapter

L. K. Pruett, Director of the American Society of Abrasives, presented the charter for the Flint, Mich. Chapter to R. C. Moore, President, and W. J. Bendle, Vice-President, on October 24, 1958. This makes the eleventh chapter of the Society. Further consideration is now being given to the forming of chapters in Chicago, Cleveland, and Cincinnati.

Reading Chapter—The second meeting of the season was held at Valley Inn October 20. Robert C. Wilhelm of the Allison Co. showed an interesting sound motion picture in color on Abrasive Cut-Off. The next meeting was scheduled for November 17.

Western Massachusetts Chapter — The first public meeting was held October 2 at the Oaks Inn, Springfield, with an attendance of 38 members and guests. The speaker for the evening, Mr. Peden of Micromatic Hone Corp., presented a motion picture on the Generation of Metallic Bearing Surfaces. Following the picture he answered a number of questions from the audience.

The second public meeting was held October 20 at Oaks Inn, with 30 members and guests attending. Al Ball from Bay State Abrasives Co. spoke on "Abrasive Bonds — Their Nature and Function."

The November 17 meeting was scheduled for the same time and place with Ascher Nissen speaking on the subject of Abrasive Grains.

New officers chosen in September were: President, Nils P. Ottoson; Vice-President, Benedyk Jurkowski; Secretary, Perry Goodell; Treasurer, James Bell; Corresponding Secretary, John S. Berg. Directors included Arthur Graveline, Edward Z. Najaka, Henry Simser, John J. Rearden.

New Jersey Chapter—The first meeting of the fall season was held on September 24, at the regular meeting place, the Blue Shutter Inn in Union, N.J., with 35 members and guests present. The speaker of the evening, Gilbert R. Blake, Product Safety Engineer of Norton Co., presented a sound color film on Grinding Wheel Safety and discussed the subject further after the film.

The October meeting was held October 22. It was announced that Jerome Mitchell, of American Emery Wheel Works, was appointed Chairman of the Publicity Committee. Joseph O'Neil, Manager of Engineering in the resin products group of Carborundum Co.'s Coated Abrasives Division, presented slides and gave an interesting talk on the manufacture of coated abrasives. November 19 was scheduled for the next meeting, with the subject of Man-Made Diamonds under discussion.

Chapter officials should be contacted for information on their activities planned for the 1958-59 season:

New Jersey Chapter
John A. Cornell
194 Arlington Dr.
Fords, N.J.

Connecticut Chapter
Warren Hessels
342 Sherman Ave.
New Haven, Conn.

Hudson Mohawk Chapter
George H. Lovegrove
Marshall Eclipse Division
Tibbetts Ave.
Green Island, N.Y.

Boston Chapter
I. C. Day
96 Edwin St.
North Quincy, Mass.

Detroit Chapter
Cal E. Edwards
11368 Asbury Park
Detroit 27, Mich.

Long Island Chapter
Herman Golden
71 Lion Lane
Westbury, L.I., N.Y.

Western Massachusetts Chapter
Perry Goodell
Chain Belt Co.
369 Plainfield St.
Springfield, Mass.

Western Michigan Chapter
C. J. Hennesen
2171 Monte Avenue
Muskegon, Mich.

Reading Chapter
Joseph Acker
124 N. Front St.
Reading, Pa.

Pittsburgh Chapter
Frank F. Cramer
429 Edgewood Road
Pittsburgh, Pa.

Inquiries regarding other local chapters information should be addressed to:

Jan Deelman
American Society for Abrasives
222 Berks County Trust Bldg.
Reading, Pa.

gf ... wherever abrasive operations are performed

News of Industry

Mobile Demonstration Unit Visits Nation's Plants

To show that there can be no better time to replace old machine tools than now, the DoAll Co., Des Plaines, Ill., has outfitted a 35 ft. van with a Contour-matic band machine, a newly introduced low-cost standard contour machine, a power saw, a surface grinder, and precision measuring instruments. This mobile demonstration unit visits plants throughout the country and presents a program which shows that these machines are capable of as much as 650% more production than their predecessors of only ten years ago.

Groups of from 20 to 25 can witness the demonstration at one time. The program lasts approximately one hour, but it is sufficiently flexible to fit into most plant schedules and to emphasize those matters of greatest interest to each group. The 38 DoAll sales-service stores arrange the presentations for plants in their particular localities. Although demonstrations are tailored for interested groups at an individual plant, it is often profitable for personnel from other plants in the area to attend.

Double Pallet Loading Speeds Cleaning of Heavy Castings

A two pallet loading system for handling heavy cast iron parts used for pulverizers, mixers and ceramic and chemical extrusion machinery reportedly has enabled the Bonnot Co., Canton, Ohio, to slash cleaning time to a bare minimum.

With two identical circular steel pallets and a new 6' table room, manufactured by the Pangborn Corp. of Hagerstown, Md., Bonnot Rotoblasts a pallet load of castings while the operator is loading a second pallet and preparing it for positioning in the machine. This automatically eliminates the time the operator would spend waiting for the machine to finish the cleaning cycle so he could empty it and palletize the next load. The former cleaning method required tumbling and grinding.

This double pallet system, in conjunction with the table room, has reduced grinding time up to 50% on most castings and cut total finishing time for castings from 2½ days to less than a day.

The Bonnot Co. manufactures machinery for steel mills and clay product plants in the ceramic, chemical and mineral industries that require castings varying in size from 1 lb. to 10,000 lb.

Soluble Oil Solves Tough Machining Job

Tool life on a tough machining job at the Red Devil Tool Co. plant in Union, N.J., has been increased 25% by switching to a heavy duty soluble cutting oil. In addition to improved tool life, fewer tool changes per day are required, thus increasing production by 10%. An experimental run was tried last December with five gallons of Gulfcut Heavy Duty Soluble Oil, a product of Gulf Oil Corp. of Pittsburgh. Soon a complete switch was made to this oil. The new product has completely eliminated rust and odor.

Tool life in machining conditioner crankshafts on this Fay Automatic Lathe has been increased since using Gulfcut Heavy Duty Soluble Cutting Oil. Tools had to be reground after 60 pieces; now they are reground after 75 pieces, and hope to go to 90 pieces in the future.

The machined part is the crankshaft for the company's line of electric paint-conditioning machines.

Ten Machine Tool Companies Receive Advertising Awards

Ten machine tool companies received awards in this year's Advertising Competition sponsored by the Advertising and Market Research Committee of the National Machine Tool Builders' Association, it was announced by Herbert

E. Carson, Advertising Manager of Niagara Machine & Tool Works, Buffalo, N.Y., who is General Chairman of this committee of the Association.

The awards certificates were presented to the winning companies at the Association's annual meeting at Hot Springs, Va., November 6. A total of 235 entries in the competition were received from 49 companies.

The six categories in the contest for which awards were made and the winning companies are as follows:

Category 1, trade paper advertisement, black and white—First: National Automatic Tool Co., Inc., Richmond, Ind.; Honorable Mention: The Warner & Swasey Co., Cleveland, Ohio.

Category 2, trade paper advertisement, two colors—First: The Fosdick Machine Tool Co., Cincinnati, Ohio; Honorable Mention: DeVlieg Machine Co., Royal Oak, Mich.

Category 3, trade paper advertisement, three or more colors—First: The New Britain Machine Co., New Britain-Gridley Machine Div., New Britain, Conn.; Honorable Mention: Buhr Machine Tool Co., Ann Arbor, Mich.

Category 4, catalog or bulletin describing a single type machine—First: The Minster Machine Co., Minster, Ohio; Honorable Mention: Cincinnati Lathe and Tool Co., Cincinnati, Ohio.

Category 5, catalog or bulletin describing a line of machines (general)—First: The Lodge & Shipley Co., Cincinnati, Ohio; Honorable Mention: Clearing Machine Corp., Div. of U.S. Industries, Inc., Chicago, Ill.

Category 6, best single direct mail piece—First: Clearing Machine Corp., Div. of U.S. Industries, Inc., Chicago, Ill.; Honorable Mention: The Lodge & Shipley Co., Cincinnati, Ohio.

"The purpose of the competition of this year," Carson explained, "was to arouse greater interest throughout the machine tool industry in developing advertising techniques which would be more attractive as well as contain more information of the kind buyers of machine tools want."

This is the fifth advertising contest to be sponsored by the Association.

Chicago Industrialist On Trade Mission To India

Herbert Harig, President of the Harig Mfg. Corp. of Chicago has been selected by the U.S. Dept. of Commerce as a member of a six man trade mission team to India. Harig is a specialist in the Tool and Die Field. The purpose of the mission is to promote better relationships between U.S. and Indian people through face to face contacts with businessmen, and in meetings with chamber of commerce groups and rotary clubs in 15 cities. The tour is expected to take four weeks and wind up on December 10 at the U.S. Sole Exhibit in New Delhi.

H. Harig

Roll out the ROTORS

BG8-HT Rotor Grinder with Automatic Loading Fixture.

...FIRST in Abrasive Belt Grinding—
gives you mass production and quality control in

ROTOR GRINDING

with the New BG8-HT ROTOR GRINDING MACHINE

Completely automatic, the new Engelberg Model BG8-HT requires no manual operation. Rotors are automatically fed, precision sized and discharged in production quantities in a continuous cycle. Saves time, cuts rejects.

Check these production examples of the BG8-HT: 3⅜" O.D.; 2-up; 180 per hour (.030 stock removal from 2" stock.) 1-9/32" O.D.; 6-up; 1,440 per hour (.010 stock removal from ⅞" stock.)

Engelberg Model BG8-HT Features

★ Holds ± .001 diameter and within .0005 concentricity.

★ Hydraulically actuated feed movements, including table feed, oscillation, regulating wheel and belt tensioning.

★ Variable regulating wheel speeds to accommodate 1 to 4½" diameter range of rotors.

★ Automatic air-electric device provides constant in-process gauging, guaranteeing precision size control.

WRITE FOR MORE INFORMATION ABOUT THE ENGELBERG ROTOR GRINDING MACHINE

ENGELBERG, INC.

Precision ABRASIVE BELT GRINDERS

186 SENECA STREET • SYRACUSE, N.Y.

A FREE COST-CUTTING CONSULTANT

INDUSTRIAL DISTRIBUTORS · SERVING INDUSTRY ECONOMICALLY · THE RIGHT HAND OF PRODUCTION

Your local Industrial Distributor has gained wide experience in serving many industries and in providing solutions to a variety of production problems. His service begins with an idea — a cost-cutting idea in the form of a product or method which he is willing to suggest at no charge to you.

A COST-CUTTING TOOL

He frequently recommends Anderson wire brushes for those jobs requiring production efficiency with top quality results.

For lowest cost per unit processed select: Anderson.

Write for complete catalog of wire brushes with detailed selection and operation data.

Anderson

ANDERSON CORPORATION
1052 Southbridge Street
Worcester 10, Mass.

Bright Tumbling Gives Chains a "Silvered" Look

Brightness, to permit complete inspection and afford new eye appeal, has added a welcome touch to Kuplex chain components and Registered Alloy slings now being manufactured by the American Chain Division, American Chain & Cable Co., Inc., York, Pa.

After being shot-blasted in a Wheelabrator Tumblast unit for a five minute period, the parts are further protected with a rust-inhibiting solution which dries like a clear lacquer. The bright finish is attained by using a predetermined quantity of GL-40-Hard and 40-S170-Soft grit, mixed in a fifty-fifty ratio.

Reconditioning Service For Solid Carbide Tools

The Raymac Division of Dexco Corp., 15490 Dale Ave., Detroit 23, Mich., announces its greatly enlarged services for custom reconditioning solid carbide tools. This program has been speeded up in answer to customers' problems of maintaining a well-balanced toolroom stock. In addition to reconditioning tools of their own make, Raymac is also equipped to regrind other tools to customer prints.

Special radius rotary file (left)—To repair this tool is was necessary to add material to shank. Head was reground to customer specification. End mill-ball end (right)—This end mill was badly chipped and had fractured flute edges. Reground and lapped to customer's prints, it is again on the production line.

Enlarging on its program of reconditioning solid carbide tools, Raymac is prepared to offer a complete service in salvage of broken or badly chipped tools. The Raymac System uses the remaining stock for making tools of smaller size to prints, or by brazing on additional material, tools of the same size can be reground to specifications.

Stuart W. Pollock, President of Dexco Corp., suggests: "With today's costs being so very high it is advisable not to discard any dull or broken solid carbide tool. We believe our reconditioning and salvaging departments can help reduce production costs, keep toolroom stocks low, with our suggested efficient operating plan designed around each individual plant problem."

Battelle Research Produces Info on 3 Casting Alloys

New data has been accurately determined on 16 mechanical and physical properties of three copper-base casting alloys—80-10-10, 85-5-5-5-5, and 88-6-1½-4½ (Navy "M")—it was announced by the Brass & Bronze Ingot Institute, Chicago.

"The availability of this authoritative data on the mechanical and physical properties of the most-often used copper-base casting alloys should be of great significance to all users of nonferrous metals," I. Glueck, Secretary, said.

Complete details of the studies sponsored by the BBII at Battelle Memorial Institute, Columbus, Ohio, will be published in two papers by the American Society for Testing Materials. They are: "Mechanical and Physical Properties of Three Low-Shrinkage Copper-Base Casting Alloys" and "The Creep Properties of Three Low-Shrinkage Copper-Base Casting Alloys." Reprints will be available free of charge from the Brass & Bronze Ingot Institute, 308 W. Washington St., Chicago 6, Ill.

Natural Diamond Mesh Ready For Wheel Uses Now Available

Fragmented natural diamond boart is now being shipped to the United States in graded mesh sizes ready for use by diamond wheel and saw manufacturers, according to a recent announcement by Industrial Distributors (1946) Limited.

The new service replaces the system of supplying fragmented boart to buyers in America. Formerly, each buyer performed his own crushing operation, a highly technical method of reducing boart to specific mesh sizes required for the production of various grinding, polishing, and sawing tools.

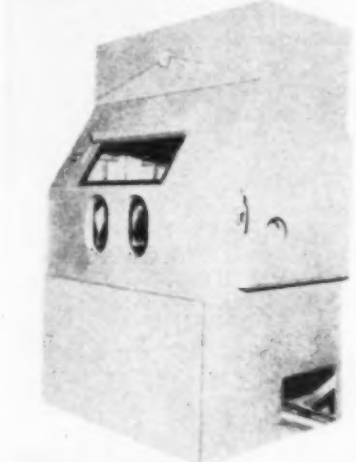
Fragmented boart is being offered in 13 United States standard grit sizes. The coarsest grain size is designated as size 16/20. This numerical designation means that all the diamonds in the size are small enough to pass through a No. 16 sieve (a sieve made from wire mesh which has 16 divisions to the inch) and are all too large to pass through a No. 20 sieve (mesh with 20 divisions per inch). The smallest boart size offered in the prepared shipments is designated as size 325/400.

With 13 grit sizes of prepared boart available, the specifications for practically all types of saws and diamond wheels produced in America can be met.

The availability of pre-treated crushing boart which has been prepared, sized, and evaluated for shape count under precisely controlled conditions, should remove an important variable from the production of diamond wheels and saws, and result in more uniform performance for industrial users of these tools.

Frederic B. Stevens, Inc. Hydra-Blast Distributor

Frederic B. Stevens, Inc., 1800 18th St., Detroit, announces the addition of Hydra-Blast supplies and equipment to its metal finishing line. Hydra-Blast is a manufacturing division of Automation Services, Inc., of Detroit. It produces a wet blasting process wherein water and abrasives are ejected from a blast gun by means of compressed air. This process is used for de-scaling, wet-honing, deburring, blending, and cleaning a great many parts manufactured by a wide range of industries.



This Hydra-Blast cabinet 4050 illustrates a type of manual wet blasting equipment now being distributed by the Stevens firm.

The 76-year-old Stevens concern will also distribute the automatic or manual equipment used in the Hydra-Blast process. This equipment can be either standard or custom designed and engineered, depending on the specific application.

Crane Packing Inspected By Swedish Industrial Team

A group of 23 executives and industrialists from Sweden, Denmark and Finland toured the Crane Packing Co. Plant at Morton Grove, Ill., October 10. The team, traveling under the auspices of the Royal Swedish Academy of Industry and Science, was originated by the Swedish Association of Metal Industry. The purpose of the Crane Packing Co. inspection was to get first hand knowledge of new trends and developments in management techniques in the United States, with emphasis on production management.

Gray and Kilgore, Inc., Detroit advertising agency, announces that it has retained the **A. R. Gloster Public Relations** firm as a service for its entire clientele.

The A. R. Gloster account executive for Gray and Kilgore is **John W. Fisher**. His office with complete facilities to serve Gray and Kilgore clients will be at the Gray and Kilgore agency, 18718 Grand River Ave. Gloster will supervise and augment the entire public relations activity through his firm in Suite 512 Free Press Bldg., Detroit.

Automation Services, Inc., Detroit 38, Mich., announces the formation of its Hydra-Blast Mfg. Division. Wet-blasting, custom-designed, automatic and manual machines and process cycles, as well as specially compounded wet-blasting abrasives and related supplies are the main products of this division.

Hydra-Blast products are distributed by **Davies Supply & Mfg. Co., MacDermid, Inc., A. T. Wagner Co., F. B. Stevens, Inc., Crown Chemical & Engineering Co., Canadian Hanson & Van Winkle Co., Ltd.**, and other representatives.

Frederic B. Stevens, Inc. of Detroit announces the appointment of **Chemray Corp.** of 10150 Roosevelt Rd., Westchester, Ill., as distributor for its metal finishing products in the state of Illinois. Chemray is a newly founded organization, headed by **Ray Ledford**, who was formerly associated with Industrial Filter & Pump Mfg. Co. as Sales Manager.

For the finishing touch that means so much!

Whether you're polishing the business end of a stainless steel golf club or smoothing out the rough spots in precision instrument parts, Jewel Brand Coated Abrasives ensure faster, finer finishing. On job after job, experience proves that **end products cost less when you finish with Jewel Brand Abrasives.** Prove it for yourself now, by bringing their many money-saving advantages to bear on your own finishing problems. Order from your Industrial Distributor or write for specific recommendations. Abrasive Products, Inc., 517 Pearl Street, South Braintree 85, Mass.

COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

get ALL universal features plus real economy . . .

STERLING "G-2" *Universal* TOOL & CUTTER GRINDER

Sterling Features include . . .

- 25° Tilting Spindle
- 360° Spindle Rotation
- Anti-Friction Table
- 180° Table Swivel
- 2 Speed Table Traverse
- 10¾" Swing Over Table
- Rugged Construction

Accuracy, Long Life and Low Upkeep are Built-In

From the heavy cast, vibration damping, base to the two speed motorized tilting spindle the STERLING "G-2" is built for easy operation and maximum accuracy. Set-up can be made faster on a wider variety of jobs because of the built-in versatility of the STERLING "G-2". Work is finished more accurately, too, because of the built-in stability.

For maximum capacity, versatility and accuracy with minimum investment, investigate the STERLING "G-2" Universal Tool & Cutter Grinder. Plain grinder also available. Ask your STERLING Dealer or write direct for details.

McDONOUGH MANUFACTURING CO. — 1522 GALLOWAY, EAU CLAIRE, WISC.

BETTER CUT WITH BEAVER CUT CARBIDE

Cushion Ground and Micro-Lapped Rotary Files, Grinding Burrs, and Center Lapping Tools outlast regular ground carbide tools by 30% yet cost no more.

You may make a greater saving by sending us your dull tools for sharpening by our manufacturing method.

Beaver Cut Rotary File Company
401 E. Slauson Ave.
Los Angeles 11, Calif.

WALLS TU-WAY BELT SANDER

Full 1/3 h.p. G. E. Motor

USE IT EITHER WAY

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little. .

complete with cord, plug, switch ready to use **$89.95**

Illustrated Literature on Request
A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

NEWS OF INDUSTRY *continued*

The **Landis Tool Co.**, Waynesboro, Pa., has acquired all the shares of stock of **John Lund Ltd.**, a British company that manufactures grinding and fine boring machines in Cross Hills, near Keighley, England. The new British subsidiary will continue its present lines and in addition manufacture the special and semi-special grinding machines now produced by Landis Tool Co. and its subsidiary, **Gardner Machine Co.**, located in South Beloit, Ill.

John Lund Ltd. will have its name changed to **Landis-Lund Limited**, and operations will continue under the same Managing Director. Officers of the new subsidiary are: **M. A. Hollengreen**, Chairman; **John E. Hill**, Managing Director; and **J. H. Smith**, Secretary.

The **Bucheimer Tool Sales Co.** has been appointed as an authorized sales representative of the **American Coldset Corp., Tool and Wheel Division**, Teterboro, N.J. The firm will handle sales of the diamond tools and diamond grinding wheels manufactured by American Coldset, covering the state of Maryland and parts of eastern Pennsylvania, with headquarters at 24 West Alleghany Ave., Towson, Md.

E. D. Carr

Ernest D. Carr has been appointed a Sales Engineer in the Metal Finishing Division of Frederic B. Stevens, Inc. of Detroit, manufacturers of metal finishing equipment and supplies. Carr will represent the organization in Maine, Vermont, Massachusetts, Rhode Island, and New Hampshire. He will make his headquarters at the Stevens Branch in New Haven, Conn.

Prior to affiliating with the firm, Carr spent seven years as a Sales Engineer for a distributor of electroplating supplies in Cambridge, Mass.

T. S. McCrory

Thomas S. McCrory has been named Regional Manager of Wheelabrator Corporation's West Coast sales organization, and will headquarter in Los Angeles. He will have supervision of the company's present Seattle, San Francisco, and Los Angeles territories.

McCrory was Western Sales Manager of Baldwin-Lima-Hamilton Corporation's Niles Tool Division before joining Wheelabrator.

H. M. Richey

C. L. Richey

H. A. Tobey

H. N. Stone

J. A. Mahoney

S. Trzaskos

Harley Hiscock Elected Fuller Merriam President

Harley J. Hiscock has been elected President and Treasurer of The Fuller Merriam Co. of West Haven, Conn., manufacturer of grinding wheels. He came to the company in 1948 as Plant Manager, was elected Vice President in 1950, and a Director in 1952.

Hiscock is a Director of the Grinding Wheel Institute and a member of its Research Projects Committee.

as a toolmaker, and Donze in 1919.

Charles L. Richey has been named General Production Manager of the Bearing and Rock Bit Divisions, having been Assistant General Production Manager since 1956.

Henry A. Tobey is now General Factory Manager of the Bearing and Rock Bit Divisions, filling the vacancy left by **H. M. Richey** who was elected Vice-President. Tobey affiliated with the firm in 1928, and was Factory Manager of the Canton and Gambrinus Bearing Factories at the time of his promotion.

Appointments At Timken Company

Herchel M. Richey was elected Vice-President In Charge of Manufacturing, Roller Bearing and Rock Bit Divisions of The Timken Roller Bearing Co. of Canton, Ohio. He replaced **A. M. Donze** who retired October 31, but will remain a member of the Board of Directors. Both have served the company for many years, as Richey came to them in 1916

Dr. H. Nathan Stone has been named Director of Research and Development at the Bay State Abrasive Products Co., Westboro, Mass. He replaces **Albert L. Ball**, who has retired and will continue in the company's employ as Technical Consultant.

Dr. Stone joined the firm in 1952 directly from the Norton Co., where he was a Research Engineer. He is the author of several inventions in the field of abrasive products.

John A. Mahoney, Jr., has been named as Sales Engineer for the Pangborn Corporation of Hagerstown, Md. In his new position, he will be headquartered at the Philadelphia district office of Pangborn, 806 West Ave., Jenkintown, Pa. Mahoney was previously associated with Reeves Pulley Co. in Philadelphia as a Sales Engineer.

Stanley Trzaskos has been appointed Product Engineer for The Fuller Merriam Co., West Haven, Conn., manufacturer of grinding wheels. He will be in charge of quality control and product development. Trzaskos has been associated with a Massachusetts manufacturer of abrasive products for the last seven years.

Jerry Heaston is the new Assistant Manager of the Product Planning Dept. of Skil Corp. of Chicago. He will work with **W. H. Ferry**, Manager of the Department, on special assignments involving product and technical education.

DOTCO
PNEUMATIC TOOLS

- Truer operation because of Erickson Collets
- High speeds and power for faster metal removal
- Longitudinal serrations for easier gripping
- Contoured for easier handling
- Sealed ball bearings for longer life
- Light weight

Model 1 GL Dotco tool shown; other sizes and types, including angle-drive, available. AA-6838

DOTCO
PNEUMATIC TOOLS
DOEDEN TOOL CORPORATION, *Sherwood, Ohio*
Some select distributorships still available

NEW
AIRETOOL GRINDERS HANDLE TOUGH JOBS EASILY

Production workers save time, turn out more work with these 2 new Airetool grinders. Both are designed for comfortable, easy handling to step up worker efficiency.

MODEL 500

extra heavy duty horizontal grinder has unmatched versatility. Equipped with 3" bonded wheel, it licks tough grinding jobs with ease . . . can't be beat for working around irregular shapes. Handles fine finishing jobs, too, when fitted with cone wheels or rotary files.

MODEL 500-V

vertical grinder takes the work out of fine finishing flat or contour surfaces. Long handles permit convenient, fast manipulation and feather-touch accuracy.

You get this same efficient, production-boosting design in all Airetool production tools. Write for Catalog No. 63.

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge

REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, England, Europe, Italy, Japan, Hawaii

EUROPEAN PLANT: Vlaardingen, The Netherlands

CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD OHIO

NEWS OF INDUSTRY *continued*

Don Johnson has been promoted to Sales Manager of Almco, Queen Products Division, Albert Lea, Minn., from Manager of the Detroit Branch operations for the past three years. He will have direct supervision of field sales operations. Also promoted were **Al Sartor** as Branch Manager of the Detroit operation, servicing Michigan, Ohio, Indiana, and Western Pennsylvania, and **Bruce Hardin** as Sales Engineer of the Michigan area. **George Shelson** was promoted to Sales Co-ordinator of the Almco, Queen Products Division.

Jack K. Schultz has been appointed as Philadelphia District Manager for the Pangborn Corp., Hagerstown, Md., manufacturer of abrasives, blast cleaning, and dust control equipment. In his new position, Schultz will direct overall sales activities and field engineering services from the district headquarters at 806 West Ave., Jenkintown, Pa.

Schultz has spent 12 years in Pangborn's home office, planning commission and 11 years in sales engineering. He has been District Sales Engineer in Philadelphia since 1951.

D. Johnson

A. Sartor

B. Hardin

J. K. Schultz

Charles S. Stock, Manager of the Unit Ventilator Products Department, American Air Filter Co., Inc., Louisville, Ky., has been elected to the Executive Committee of the Producers' Council, Inc. Election was announced at the national organization's recent convention at Miami, Florida.

Producers' Council is composed of the nation's leading manufacturers of building materials and equipment and their trade associations.

G. R. Davenport has been appointed sales representative for American Coldset Corp., Tool and Wheel Division, Teterboro, N.J. He will handle sales of the diamond tools and diamond grinding wheels the company manufactures, in New York City, Long Island, Staten Island, and southeastern New York state up to Poughkeepsie.

Other sales representatives named are **C. R. Gilmore,** covering northern Ohio, and **E. B. Naber,** whose territory is the state of Florida.

Chester J. Taylor and his brother **George T. Taylor** retired September 30 as Norton Company Abrasive Engineers after careers that began for both in 1912.

John W. McCue, formerly a field engineer at the Indianapolis District Office, has been appointed an Abrasive Engineer to succeed Chester in the Indianapolis area. **David B. Foy,** also a former field engineer, in the same office, will succeed George in the South Bend, Indiana, area.

Charles A. Bogenrief has been appointed Director of facilities and tooling by Robertshaw-Fulton Control Co., Richmond, Va. He has been head of the Industrial and Plant Engineering Department of the company's Grayson Division, Long Beach, Calif., since 1942. Bogenrief came to be with the firm in 1937 after attending the University of Nebraska.

DADDY . . . diamonds can be a man's best friend when they're mounted in a Threadwell Tangi-matic dresser. You can dress grinding wheels quickly and accurately with this direct reading dresser. With all the time you'll save you can spend more time down here with me. See your Threadwell Distributor now, just for me, huh.
Photo by Peter Gowland for Threadwell Tap & Die Company, Greenfield, Mass.

REGULAR DRESSING LOWERS BELT COST

Save up to 40% of abrasive belt cost—get greater production at the same time! Use inexpensive Desmond Beltbrasive® dressers to quickly clean out loaded belts, discs, or drums. Expose a new, sharp surface. Works for metal, plastic or wood—one light pass at the onset of loading is all you need. Ask your Desmond distributor or write direct for Bulletin D-12.

The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Thomas M. Purtell is the new General Manager of Sales for The Anderson Oil and Chemical Co., Inc. of Portland, Conn. Purtell joined the company in 1947 as a sales representative and in 1952 was named Sales Engineer. He will be responsible for consumer and distributor sales of Lusol and the company's other water soluble metalworking solutions and industrial oils that are marketed throughout the United States, Canada, and Europe.

Frank W. Schreiner has been named District Manager at the Cleveland office of Pratt & Whitney Co., Inc., West Hartford, Conn. He succeeds **Frank W. Harrison** who is leaving the company after 39 years' service.

Arthur C. Dade has been named Cutting Tool and Gage Sales Manager for the Cleveland territory.

W. W. Wellborn has been appointed Technical Director for the Carbide Division of Firth Sterling Inc., Pittsburgh. In his new position, Wellborn has assumed the responsibility for process metallurgy and the metallurgical aspects of Quality Control in the Carbide Division.

Obituary

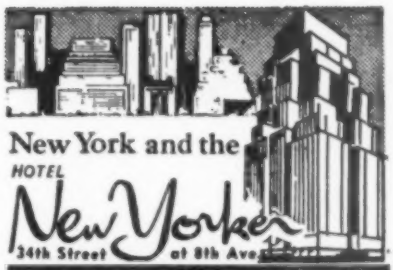
Harrison Fuller, Founder and President of The Fuller Merriam Co., West Haven, Conn., died September 22. He was a leader in civic and industrial circles and was President of the Manufacturers Association of Connecticut.

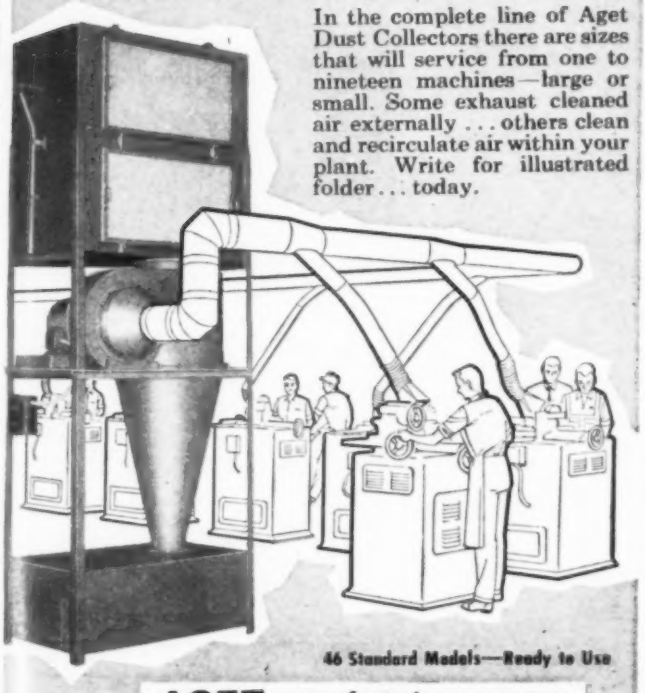
James S. Freese, 54, who was General Production Manager for The Timken Roller Bearing Co. of Canton, Ohio, died at his home October 13, after an illness of several months.

Robert Wallace Nelson, 48, Vice-President of American Air Filter Co., Louisville, Ky., died suddenly October 9. He was a former President of the Air Moving and Conditioning Association, and a member of the American Society of Heating and Air Conditioning Engineers.

DISTRIBUTORS WANTED
Territories open in all states. If you are interested in being a distributor of Diamond Wheels, Tools, Coated Abrasives, Solid Abrasives, Carbide Burrs and High Speed Cutting Tools of excellent quality.
Write Box 25
c/o GRINDING & FINISHING
Wheaton, Illinois

COATED ABRASIVES & REINFORCED RESINOID WHEELS
World renowned abrasives with a difference offer highly profitable addition to distributors or manufacturers representatives of allied lines. Precision fabricated Hermes products do a better job with maximum production life at less cost. Many select territories still available. Call, write Dept. GF-12
UNITED MINERAL & CHEMICAL CORP.
16 Hudson St. BE 3-8870 New York 13, N.Y.


New York and the HOTEL New Yorker
34th Street at 8th Ave.
just naturally go together
New York's largest skyscraper hotel. 2500 rooms, all with bath and free radio—television in many. Meditation Chapel open to all faiths. Direct entrance to Pennsylvania Station. Facilities from 100 to 1200 for Banquets, meetings, etc. Three air-conditioned restaurants.
LAMP POST CORNER . . . COFFEE HOUSE
GOLDEN THREAD CAFE
from $7 Doubles from $11 Suites from $23
JOSEPH MASSAGLIA JR., President
CHARLES W. COLE, Gen. Mgr.
Other MASSAGLIA HOTELS
• SANTA MONICA, CALIF. Hotel Miramar
• SAN JOSE, CALIF. Hotel Sainte Claire
• LONG BEACH, CALIF. Hotel Wilton
• GALLUP, N.M. Hotel El Rancho
• ALBUQUERQUE, Hotel Franciscan
• DENVER, COLO. Hotel Park Lane
• WASHINGTON, D.C. Hotel Raleigh
• HARTFORD, CONN. Hotel Bond
• PITTSBURGH, PA. Hotel Sherwyn
• CINCINNATI, O. Hotel Sinton
• NEW YORK CITY Hotel New Yorker
• HONOLULU Hotel Waikiki Biltmore
CHICAGO MIDWEST HEADQUARTERS
BOOKING OFFICE 200 E. Walton DE 7-6344
BOSTON OFFICE 80 BOYLSTON ST. HU 2-0360
World-famed hotels
Teletype service—Family Plan

just ONE DUSTKOP STOPS DUST
heavy duty unit services up to 19 MACHINES
In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.

46 Standard Models—Ready to Use
AGET manufacturing company
1380 Church Street • Adrian, Michigan

ACCURACY .0002 T.I.R.
.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose
SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available
MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.
Clip ad to your letterhead and send for Literature
K. O. Lee Company, Aberdeen, S. D.

A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

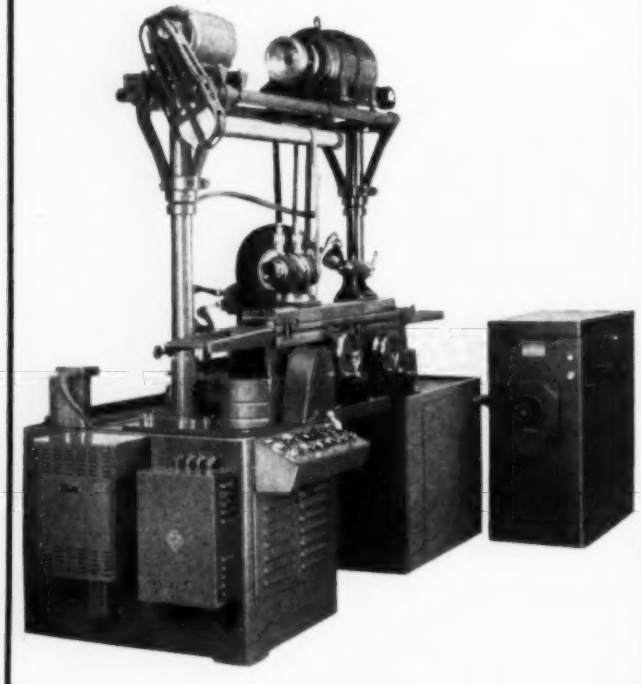
When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

EASY OPERATION: CLOSE TOLERANCES:

ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.



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Since 1910

CRYSTAL LAKE, ILLINOIS

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R. G. Becker

James R. Reed has been appointed Manager of the newly established Special Products Department at the Bay State Abrasive Products Co., Westboro, Mass. His department will assume the responsibility for field testing and market development of new and special products that are not currently included in the company's major lines of abrasive products.

Roland G. Becker is now Manager of Sales Engineering for Bay State, having spent the past six years as abrasive engineer for the company in the Cleveland, Ohio, sales area.

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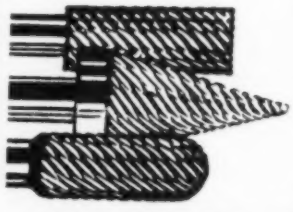

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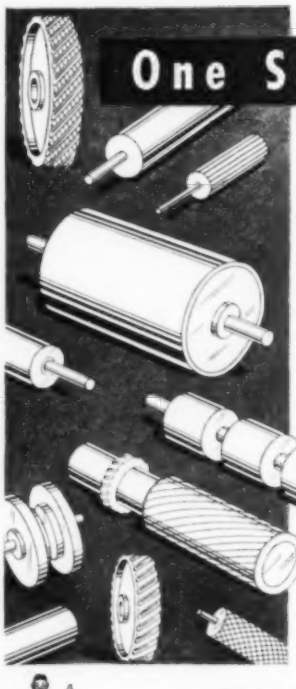

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Index to Advertisers in December Issue

TO OBTAIN INFORMATION FROM ANY OF THESE ADVERTISERS, FIND THE BOLDFACE KEY NUMBER *PRECEDING* THE ADVERTISER'S NAME . . . AND CIRCLE THAT NUMBER ON ACTION CARD AT RIGHT

Circle No.		Page No.
201	Abrasive Products, Inc.	59
202	Aget Manufacturing Company	63
203	Airetool Manufacturing Company	61
204	American LIP Corporation	52
205	Anderson Corporation	58
206	Beaver Rotary File Company	60
207	Besly Welles Corporation	8, 9
208	Blanchard Machine Company, The	32
209	Brightboy Industrial Division, Weldon Roberts Rubber Company	51
210	Brown & Sharpe Manufacturing Company	2, 3
211	Brunmar Commercial Corporation, Abrasive Sales Division	4
212	Bryant Chucking Grinder Company	15
213	Chicago Rubber Company	64
214	Cincinnati Milling Machine Company, Grinding Wheels Division	30
215	Cortland Grinding Wheels Corporation	17
216	Cosa Corporation	44
217	Crystal Lake Grinders	64
218	Desmond-Stephan Manufacturing Company	62
219	Diamond Products, Inc.	50
220	Doeden Tool Corporation	61
221	Elgin National Watch Company	16
222	Engelberg, Inc.	57
224	Erickson Tool Company	Fourth Cover
225	Exolon Company	7
226	General Electric, Metallurgical Products Department	35
227	Hill Acme Company	18
228	Hitchcock Publishing Company	Card Insert
229	Hotel New Yorker	63
230	Kirk & Blum Manufacturing Company	12
231	Kuzmick, Paul L. Company	54
232	Lee, K. O. Company	63
233	Lilly, Eli & Company	5
234	Manhattan Rubber Division, Raybestos-Manhattan, Inc.	11
235	McDonough Manufacturing Company	60
236	Metallurgical Products Department, General Electric	35
237	Moore Special Tool Company	53
238	Murray-Way Corporation	54
239	Norton Company, Abrasive Grains Division	13
240	Pekay Abrasives Company	54
241	Peninsular Grinding Wheel Div.	Third Cover
242	Precise Products Corporation	46, 47
243	Raybestos Manhattan, Inc., Manhattan Rubber Division	11
244	Robbins, Omer E. Company	48
245	Rota File Corporation	64
246	Smit, Inc., J. K. & Sons	49
247	Thompson Grinder Company	Second Cover
248	Threadwell Tap & Die Company	62
249	U. S. Electrical Tool Company	54
250	Vulcan Tool Company	6
251	Walls Sales Corporation	60
252	Weldon Roberts Rubber Company, Brightboy Industrial Division	51

Handy Information Cards

THE two postpaid post cards at the right are to help you obtain information about products advertised in this issue. These cards provide key numbers for you to circle to get information about any new product item, free literature item or advertisement published in this issue. New product and literature items are numbered where they appear. For information about any advertisement, simply find the manufacturer's name in the Advertising Index above, note the boldface number preceding the name and circle that number on the Action card. Before sending the card, please check to see that you have included your name and address.

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ADVERTISEMENTS:

140 141 142 143 144 145 146 147 148 149 150 151 152 153
154 155 156 157 158 159 160 161 162 163 164 165 166 167
201 202 203 204 205 206 207 208 209 210 211 212
213 214 215 216 217 218 219 220 221 222 223 224 225 226 227
228 229 230 231 232 233 234 235 236 237 238 239 240 241 242
243 244 245 246 247 248 249 250 251 252 253 254 255 256 257
258 259 260 261 262 263 264 265 266 267 268 269 270 271 272
273 274 275 276 277 278 279 280 281 282 283 284 285 286 287
288 289 290 291 292 293 294 295 296 297 298 299 300 301 302
303 304 305 306 307 308 309 310 311 312 313 A1 A2 A3 A4

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LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
	112	113	114	115	116	117	118	119	120	121	122	123	124	125			
	126	127	128	129	130	131	132	133	134	135	136	137	138	139			
	140	141	142	143	144	145	146	147	148	149	150	151	152	153			
	154	155	156	157	158	159	160	161	162	163	164	165	166	167			
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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Co. .....

Address .....

City ..... Zone ..... State .....

Product Mfd. .....

58

15
33
51
69
111
125
139
153
167
212
227
242
257
272
287
302
A4

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16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
112	113	114	115	116	117	118	119	120	121	122	123	124	125				
126	127	128	129	130	131	132	133	134	135	136	137	138	139				
140	141	142	143	144	145	146	147	148	149	150	151	152	153				
154	155	156	157	158	159	160	161	162	163	164	165	166	167				
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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Here is faster operation without unusual wheel wear incorporated in wheels that hold their corners and resist sudden shock.

They are good wheels—extra value wheels you will enjoy profitwise and otherwise! Write us about them today!

The entire line of Peninsular grinding wheels is listed in the reprinted Catalog No. 5-G, just off the press. Send for your free copy today.

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District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS CO.—DETROIT, MICH.

Erickson Precision Expanding Mandrels Solve Grinding Problems

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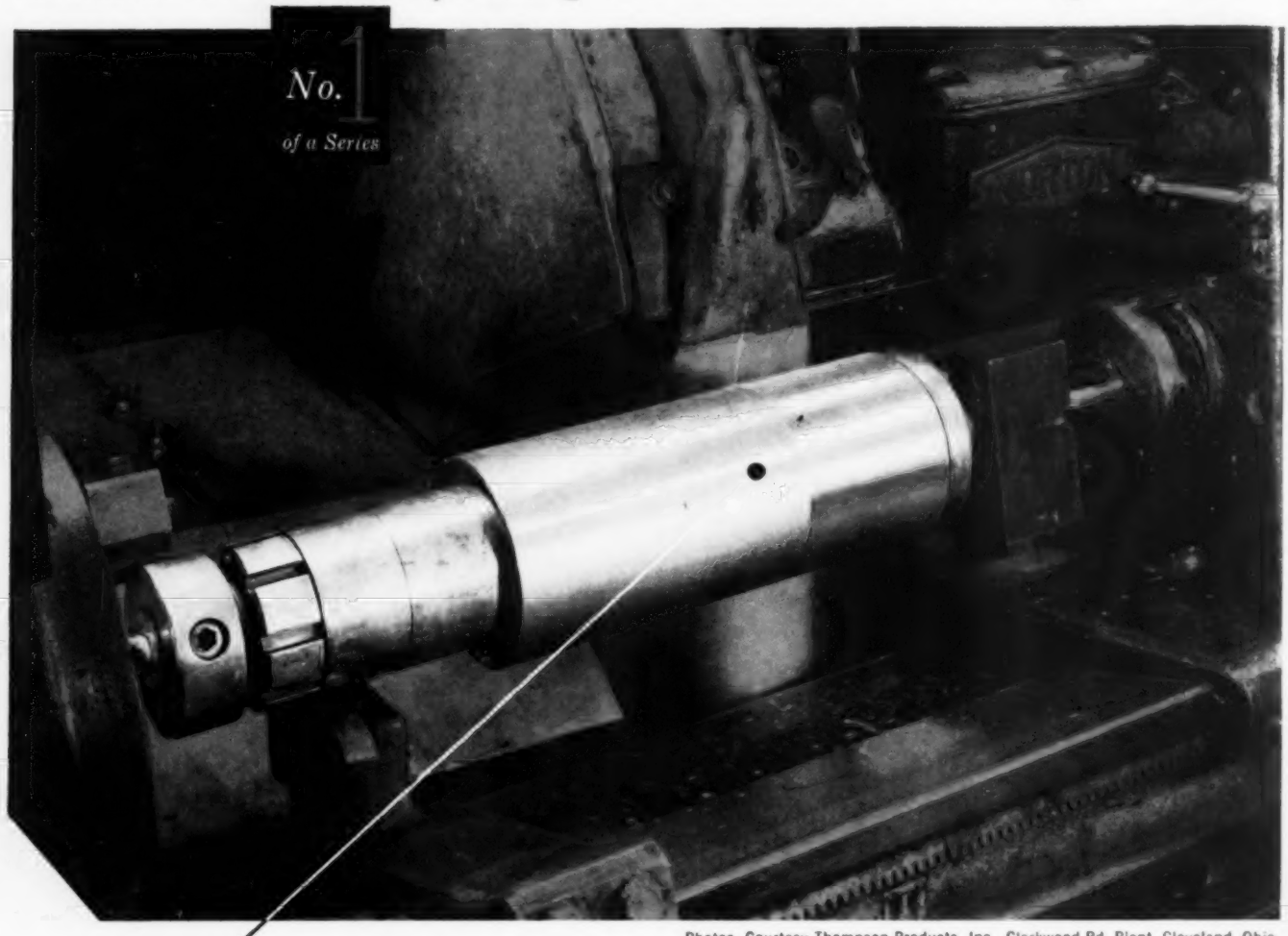

Photos Courtesy Thompson Products, Inc., Clarkwood Rd. Plant, Cleveland, Ohio

e.g. engine cylinder liners

Thompson Products, Inc., leading automotive and aircraft parts producer, originally bought Erickson precision expanding mandrels to secure better concentricity and wall thickness of a cylinder liner . . . they had formerly used single taper type expanding sleeves.

Erickson mandrels grip over the entire I.D. surface of the liner . . . thus insuring a uniform wall thickness. So Thompson switched to Erickson precision expanding mandrels for rough machining and grinding, as well as checking.

AA-2233

Collet Chucks
Floating Holders
Tap Chucks

ERICKSON TOOL COMPANY

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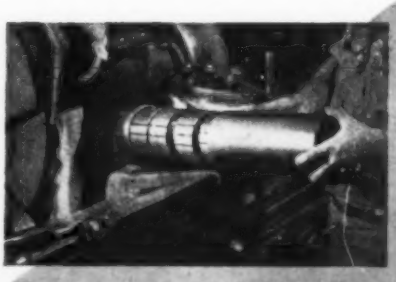
Tap Holders
Air-Operated Chucks
Expanding Mandrels
Special Holding Fixtures

Bothered by a tough internal holding problem? Then let us show you how Erickson mandrels speed production, lower grinding costs. Call us or write for Catalog K.



Instantaneous self-release speeds loading and unloading. Application (above) uses multiple-sleeve construction to hold work part along its entire length for utmost precision.